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Wisconsin Paper Mills to Spread Employment

Following Conference With Governor LaFollette, Badger State Manufacturers Agree to Revise Operating Schedules to Facilitate Engagement of More Workers—F. J. Sensenbrenner, President of Kimberly-Clark Corp., Signs Resolution Adopting Movement As Chairman for Paper Manufacturers and Other Industrialists

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., November 9, 1931.—As a final outcome of conferences with Governor Philip F. LaFollette, paper manufacturers have joined with other industrialists of Wisconsin in an agreement to spread employment as far as possible until business conditions are nearer normal. This intent was confirmed in the adoption of a resolution by heads of the industries who met at Madison, Wis. F. J. Sensenbrenner, president of the Kimberly-Clark Corporation, who acted as chairman for the business men, signed the resolution.

The state's payroll will be divided among a greater number of employees by manipulating the hours of employment so men will be employed for shorter periods in order to give others work also. Shorter working schedules already have been adopted by some of the mills, after training enough men to take all positions during the absence of others.

Paper manufacturers taking part in the conference besides Mr. Sensenbrenner were: N. H. Bergstrom, secretary-treasurer of the Bergstrom Paper Company, Neenah; W. C. Wing, president of Fox River Paper Company, Appleton; L. L. Alsted, president, Combined Locks Paper Company, Appleton; E. A. Oberweiser, president, Whiting-Plover Paper Company, Stevens Point; C. B. Clark, president, Riverside Paper Corporation, Appleton; A. C. Gilbert, president, Gilbert Paper Company, Menasha; W. H. Miner, Menasha Wooden Ware Company, Menasha; J. M. Conway, president, Hoberg Paper and Fibre Company, Green Bay, and R. E. Thickens, George Banta Publishing Company, Menasha.

New Bleach Plant for Interlaken

The Interlake Pulp and Paper Company's new $150,000 bleach plant at Appleton is to be ready for operation about January 1, according to plans of C. K. Boyer, mill manager. In addition to the seven large bleach tanks, there will be installed special machinery for washing pulp after it has been bleached. Two de-watering presses are to be added to remove the water from pulp. Hot air heating will be used, but the air will be filtered through oil so it is pure at all times. Automatic temperature control will also be used in the building. The bleachers are to be lined with white tile to prevent corrosion, and copper pipe will be used throughout for the same reason. This mill is a branch of the Consolidated Water Power and Paper Company and has been owned by them since 1917. Seventy-five of the company's employees are being used on the construction work under the supervision of the company's engineering department. Each man is given five days' work a week.

Paper Box Makers Questioned

Representatives of several paper box manufacturing concerns have been called for questioning during the last week in the statewide investigation conducted by the attorney general's office to determine whether there have been agreements in restraint of trade, or price fixing agreements. The latest questioning has been directed at the Molitor Box Company, the Milwaukee Paper Box Company, and the A. George Schulz Company. J. B. Schmitt, a former sales manager for the Molitor company, testified that these three manufacturers were supplied with a list of each other's customers, and that they were agreed that one would not disturb the other's patrons. The arrangement also was referred to by Ralph C. Inbusch, sales manager of the Molitor Box Company. The testimony resulted in another postponement of the proceedings while state auditors are sent into these concerns to go over the records.

J. M. Conway Addresses Kiwanis Club

Decline of the paper industry in Wisconsin is seen by J. M. Conway, president of the Hoberg Paper and Fibre Company, Green Bay, Wis. He gave an address before the Kiwanis Club of Green Bay recently relative to business conditions, and voiced his opinion that this country will survive the depression as readily as in the past. His comments on the paper industry were as follows:

"The paper industry of the state has shown remarkable progress in the last 25 years. However, I am afraid that in the next 25 years the industry will decline rather than advance, in view of the shifting of industry closer to sources of raw materials. The west has become a big factor in pulp and paper manufacturing; Canada in the last few years has absorbed the news print industry; the south has gone into the manufacture of kraft papers; all of these grades which have been, and to some extent still are manufactured in the state will eventually, in my estimation, be eliminated from Wisconsin manufactures.

(Continued on page 24)

Pennsylvania Paper Mills Are Marking Time

Manufacturers Producing Bonds and Ledgers Operating From Three to Four Days Weekly—Book Paper Plants More Active With Large Contract Orders—Board Mills and Roofing Manufacturers Report Business Restricted

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., November 9, 1931.—Improved paper markets were in line with the pre-holiday pickup in business generally. Though hand to mouth buying continued, demand was broader, with consumers expanding their stocks to all grades of fine and wrapping papers and converted products. Book papers are moving in fair volume while bonds and ledgers are in growing request. Paper manufacturers are on part time production schedule, owing to the slower pace of business. Book papers keep the fine paper mills at full speed where contracts for large printers and publishers are considered. Other manufacturers are producing bonds and ledgers for present needs on from three to four day working week. Board mills and roofing manufacturers report restricted business which holds operations down to part week production.

Paper Conditions Discussed at Dinner

At a specially called meeting of the Philadelphia Paper Trade Association, held in the Penn Athletic Club, there was taken up trade topics and business conditions and the need of closer co-operation of the dealers in the present crisis. All the houses linked with the association were represented at the dinner session, with President W. S. Wilcox presiding. The majority of dealers reported improvement and there was a better feeling generally.

New Strathmore Papers in Stock

Having announced the addition of a new line of cover papers to the Strathmore Paper Company's lines a few weeks ago, local paper merchants representing the manufacturers now have in stock the latest cover papers, Highway covers, to match the Strathmore grades previously marketed. The firms stocking the new lines are the Paper House of Pennsylvania, Raymond & McNutt, A. Hartung Inc., the Charles Beck Paper Company, and the Paper Merchants, Inc. The Strathmore company is putting in circulation an attractive assortment of printed specimens of its various papers and these are being freely mailed to consumers, including Strathmore parchments and bonds.

S. Walter Inc. Has Anniversary

S. Walter Inc., 144 North 5th street, announced the second anniversary on November 1st of its up State branch —the Lehigh Valley Paper House of S. Walter Inc.— which was established in Allentown, Pa., just two years ago. In the growth of two years business it has been necessary for the firm to secure larger quarters at 32-38 North Jordan street, where 15,000 square feet of space was taken over a short time ago. The branch house supplements the York, Pa., division and distributes in addition to the wrapping papers carried solely by the Philadelphia main quarters, an extended line of fine papers of nationally prominent mills. The stocks are being augmented from time to time as the business develops.

News of the Trade

With the growing use of highly colored fancy papers for box makers, the Paper Service Company, 30 North 6th street, finds that its business on jazzy hued designs is increasing. The company, which specializes in these grades of fancy papers, has booked a large volume of business in these jazz colors for next year's needs.

Having completed installation of specially constructed equipment, the Paramount Paper Products Company, 3rd and Callowhill streets, is now producing a complete assortment of cellophane specialties and is doing a nice volume of business on transparent and moisture proof cellulose bags in flat, square and duplex shapes, printed and designed in one and two colors.

The Enterprise Paper Company, 3rd and Callowhill streets, has under the progressive management of the head of the firm, Nathan D. Isen, enlarged its paper specialty division by addition of a cellophane department, handling complete lines of these products in bags, wraps and other coverings. There has been installed equipment specially designed to convert these into various sizes for the trade.

Samuel Alcorn, for many years engaged in the distribution of papers in the Quaker City industry, has removed from 219 South 5th street, to larger offices and warehousing space in the Bailey Building, 600 South Delaware avenue. His firm represents principally the lines of the Saranac Pulp and Paper Company, Plattsburg, N. Y., and sanitary products.

J. K. Shryock, for many years identified with the paper board business here, and recently with P. Sullivan, Inc., one of the oldest concerns in the city, has branched into business on his own account. He has taken offices and warehouse at 412 North 3rd street, stocking chip, news, binder, manila and other paper boards.

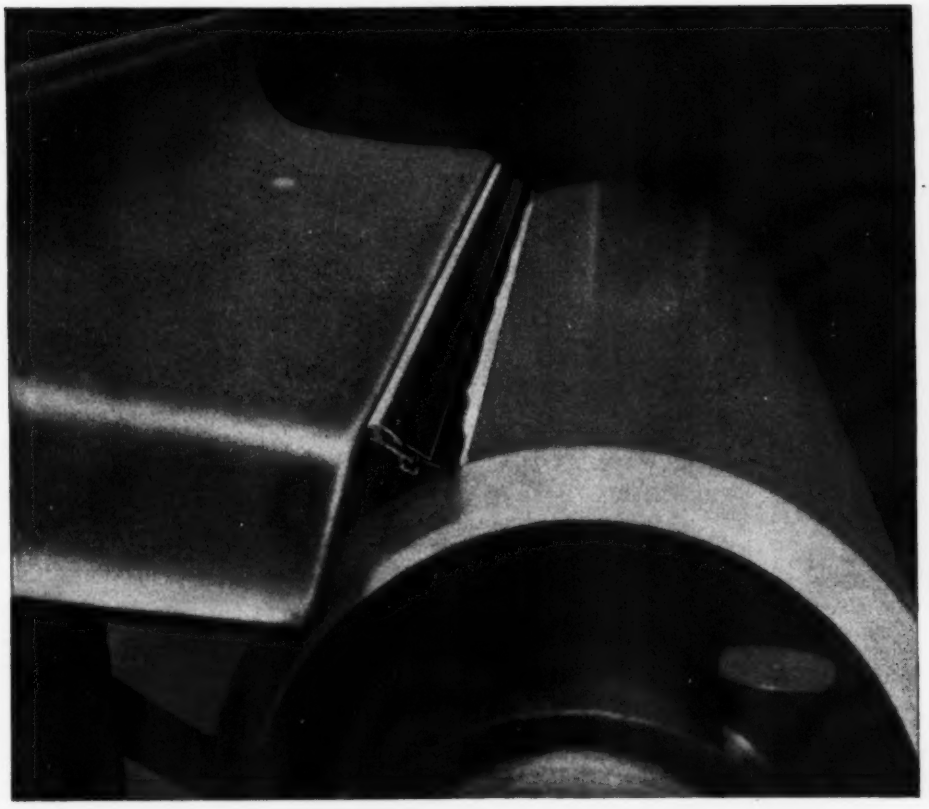
There was on display for the two weeks of the Food Show at the Commercial Museum, the full lines of paper wares manufactured by the Menasha Products Corporation, Chicago, including fancy napkins, table sets, bridge sets, paper plates, food containers, waxed papers for wraps, ice cream containers and food cartons. The exhibit was under direction of the Philadelphia Manager, George W. Sherburne.

Miss M. McCracken, who has long been linked with the business administration of large dealers in the fine paper trade, has joined the staff of Paper Merchants, Inc., 140 North 6th street, as head of the Audit Department. Miss McCracken, in recent times has been linked with the Lindsay Paper Company and formerly was with the Garrett-Buchanan Co. She has been succeeded at the Lindsay company by Miss Peggy Funk.

Morris P. Lowe, who was recently involved in bankruptcy, has again entered the paper trade in his own concern, the Paper and Twine Sales Corporation, continuing his business in the Bailey Warehouse where he formerly traded as the Universal Paper and Twine Company. He will continue to trade in wrapping paper, bags, specialties and twines.

The offices of the Milwaukee Lace Paper Company, formerly in the Jefferson Building, have been removed to 240 West Walnut Lane, where L. W. Moore continues to represent the manufacturers of lace papers for the box trade and other consumers and converters.

Myer Magil, head of the Penn Card and Paper Company, 410 Race street, leaves November 15 for a tour of the New England paper mills.



The Vickery *Hi-Angle* Doctor offers you the quickest, easiest and most economical means of eliminating press-roll troubles.

Write for the new Vickery Hi-Angle Doctor Bulletin. It presents complete information on this remarkable new development. At the same time, ask for the bulletin on the Vickery Hi-Flex, the perfect doctor for calender and super-calender rolls.

BIRD MACHINE COMPANY

South Walpole ◥◤ Massachusetts

5119

Boston Paper Market Conditions Improving

Both Fine and Wrapping Paper Distributors Report Greater Activity — Mill Supply Houses Are Receiving Larger Volume of Orders—Box Board Manufacturers Are Only Moderately Busy—Paper Stock Industry Generally Listless

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., November 9, 1931—Conditions as a whole in the paper market have continued to improve. Favorable statements have been made by both fine and wrapping paper dealers. Another indication of better business is an improvement in the volume of orders received by mill supply houses.

There has been a little more activity among fine paper jobbers. Several large orders have been placed by printers. Inquiries bearing the promise of real orders eventually are more numerous. "Riding right along on writing paper" is an expression of the state of the market in this commodity. The situation in sulphite bond is somewhat chaotic. A Boston paper man says that apparently there is no fixed price in this line at present, due to conditions. Sulphite bond was at one time fairly firm in price, but the value now varies, although, naturally, the quantity and quality enter into the question of price. The position of sulphite ledger is similar to that of sulphite bond.

Reports in the wrapping paper division vary from "about the same," "fair," and "a little better," to "wonderful." Some who have not experienced any appreciable improvement speak cheerfully as to the near future. A member of a prominent Boston house, in remarking that business conditions are improving a little, said that with his company, business so far in November had been better than that in October and that October had been better than September. No. 2 kraft and Southern kraft have been showing a downward tendency.

Box board is selling moderately well, with more demand of late from at least some consumers. The situation is not any too favorable at the present time, however, although in some quarters a fairly good business has been transacted.

The paper stock market was generally dull during last week. Whiteblank news, however, displayed an upward trend and is now quotable at 1.57½ @1.65, compared with a former range of 1.50@1.60. Old newspapers have been marked down from a range of .32½ @ .40 to .30 @ .37½.

Stone & Forsyth Celebrate Fiftieth Anniversary

Stone & Forsyth Company, manufacturers of folding paper boxes and hygienic paper specialties, with offices at 67 Kingston street, Boston, and plant at Everett, Mass., reached its fiftieth aniversary on November 1. During the entire time the present treasurer, Edward H. Stone, has been at the head of the company.

While many live to complete fifty years service in one line of business, few are privileged to see the fiftieth anniversary of a company during which time they have been at the head, and in celebration of this event, the directors, executives and salesmen of the company tendered Mr. Stone a dinner, which was held on Tuesday, November 3, at the Hotel Somerset, as a slight token of their appreciation and regard at this momentous occasion in his business career and the completion of fifty years of successful business endeavor.

News of the Trade

John B. Kennedy, associate editor of *Collier's Weekly*, and Frances Ouimet, national amateur golf champion, are to be the speakers at the Fall meeting of the Boston Paper Trade Association, to be held at the Exchange Club, November 18. There will be a reception at 6 o'clock, when members and guests will have an opportunity to meet the speakers. The program will include singing, with E. L. Cummings as song-leader.

Hartford Powel, Jr., an advertising expert, is to be the speaker at the next meeting of the New England Paper Merchants Association, to be held at the Harvard Club of Boston, Thursday evening, November 12.

The box board sales office in New England of the Robert Gair Company, has been removed to the mill of the Haverhill Division, Haverhill, Mass. C. W. Morrison, who was at the head of the Boston office, now has his headquarters at the mill. E. H. Cook, and E. W. H. Wentzel, salesmen, will work from the Boston office.

Spaulding & Tewksbury Company, box board dealers, are now handling a new line of paper cores, issued by the Elixman Paper Core Company, of Corinth, N. Y., and used particularly by board mills. This core has a new reinforced cap, with a heavy steel disk center and a square hole for use on a square shaft.

The engagement of Franklin F. Spaulding, president of the Spaulding & Tewksbury Company, to Miss Miriam Wiggin, of Tewksbury, Mass., is announced. Miss Wiggin is a teacher in the public schools of Tewksbury. Mr. Spaulding is the son of Benjamin Spaulding, for many years treasurer of the firm.

E. J. McDonnel, general manager of the Groveton Paper Company, Groveton, N. H., was in Boston last week, calling at the office of the company, of which Kenneth L. Moses is in charge.

J. F. Ryan, of the Mastercraft Paper Products Company, and A. Baron, of the Royal Card and Paper Company, Inc., both of New York City, passed a few days recently with Henry L. Goodman, calling on the trade with him.

Charles F. Munroe, of the Franklin Paper Company, Holyoke, Mass., called on the trade recently.

Hurlburt Paper Company, Lee, Mass., which was taken over by new management, the plant remodelled and new machinery installed, and started operations in November, 1930, is reported by the Lee Chamber of Commerce to have carried on a successful business since its reorganization and to be running full time with 100 employed at present.

Mill No. 1 of Bardeen Div. Starts

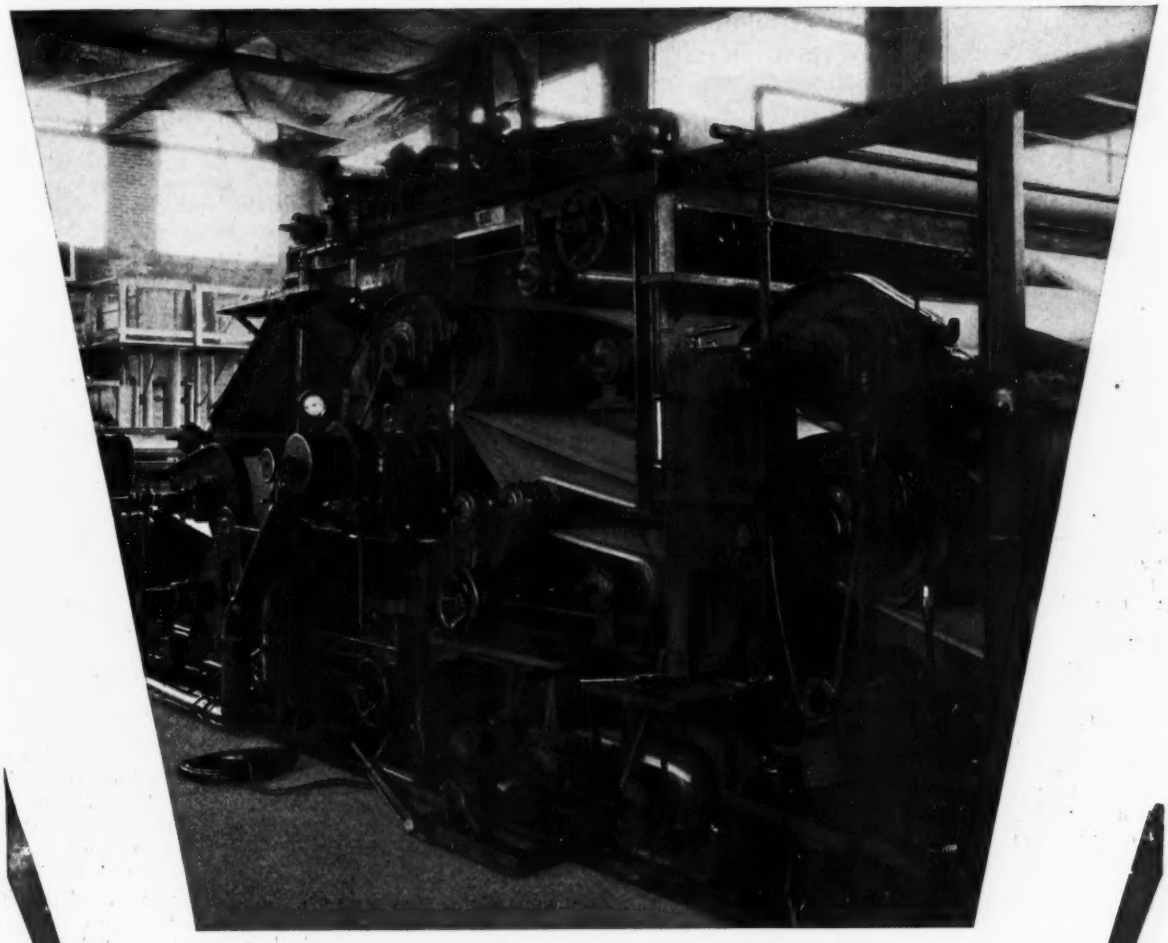
[FROM OUR REGULAR CORRESPONDENT]

KALAMAZOO, Mich., November 7, 1931.—Allied Paper Mills announce that mill No. 1 of the Bardeen division in Otsego went on production Monday morning with orders enough to run the balance of the year. Both machines are to be used. This unit has not operated the past summer.

When announcement was made that the mill would reopen every man on the tour reported for duty and a long line of disappointed applicants were unable to secure places. Bardeen mill No. 2 is down permanently.

The plant of the MacSimBar Paper Company has been fairly busy for several weeks and has orders enough ahead to keep running on the present basis for several weeks.

DOWNINGTOWN



SUCTION ROLL · · ·
· · · ON TISSUE

Regardless of the kind of paper you make, the installation of Downingtown Adjustable Suction Rolls can undoubtedly be justified on a basis of production, economy or quality. This Suction Roll is installed in first press of the Downingtown Removable Fourdrinier at the A. L. Adams Paper Co., Baldwinsville, Mass. Other manufacturers of specialties have also found the Downingtown Suction Roll to be a sound investment. Our Catalog No. 103 completely describes the features of this modern suction roll. The Downingtown Manufacturing Company, Downingtown, Penna.

Chicago Paper Market Continues Irregular

Fine Paper Section Acts Favorably to Seasonal Influences—Position of Book and Cover Papers Practically Unchanged—News Print Outlook Uncertain, With Volume of Advertising Below Normal—Kraft Wrapping Situation Unsatisfactory

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., November 7, 1931.—News bubbles vigorously out of the Chicago paper houses this week. Most of the conversation seems to deal with the seemingly hopeless situation in the kraft market and representatives of houses in other lines are hoping that the last price reductions will be final. A current topic of conversation is some new price of kraft to be gotten here and there.

The board market continues quiet, although those lines interested in holiday business notes some seasonal pick-up. News print is reported somewhat shaky as the time for new contract commitments approaches. The newspapers have not as yet found it necessary to increase the number of pages due to advertising and the reports on advertising lineage from newspaper groups gives no reason for undue optimism.

The fine paper market is fair and the market is acting favorably to seasonal influences. Books and covers remain little changed. In the waste paper division prices in many lines are unsettled. There is, in general, however, a tendency to discount any further bad news and the majority believe that the basis for an upward trend has been laid at this time.

Chicago Salesmen Celebrate Golf Victories

Perhaps the most enjoyable social meeting ever held by the Middle West Division of the Salesmen's Association of the Paper Industry characterizes the event held at the Hamilton club on the evening of November 6, when a large crowd of members and guests got together to celebrate the winning of various golf prizes, to award special golf trophies and to enjoy a real good time. Seated at the speakers table were Frank Prentiss, Howard Whitney, Harold Knott, Creighton Whiting, Phil Howard, and James H. Coy, the latter the "choirmaster" of the evening.

After an excellent dinner and some singing, led by the "voicemaster" from Flambeau, Phil Howard fired the opening gun by awarding the *American Paper Merchant* trophy to Buzz Gibson for low net at the final outing. The prize was a neat set of sterling silver candle sticks. The Harbison trophy, contested by the New York and Middle West divisions for the past four years was then presented by Harold Knott, president of the association, to Creighton Whiting, divisional vice president. The Chicago group won in 1928 and 1929, courteously defaulted to the Eastern group in 1930 and got permanent possession of the trophy put up by R. B. Harbison by winning the 1931 competition.

Phil Howard, in announcing that he would put up another inter-division prize to take the place of the one now out of circulation, also awarded a special prize to Wes Ferris, of Paton Paper, for the lowest net 36 holes during the entire season. It was a wall desk set and a beauty. Courtney Reeves copped the prize for inter-division competition on low putts, known as the Presidents prize, and given by Harold Knott. The silver centerpiece with candle sticks was picked out by Courtney's wife—making it a genuinely successful prize.

Immediately following the awarding of prizes Jim Coy led in some more singing and then Harry T. Johnson, golf chairman, was presented a check of $40.00 in appreciation of his splendid services during the golf season. The irrepressible Mr. Coy delivered the check into safe keeping. Mr. Johnson retaliated by showing moving pictures of the golf outing at Westmoreland Country Club, which featured some fancy and not-so-fancy putting by Fred Whitely. Another reel showed movie of Harry Johnson and Warren Moore playing golf at a northern course. The fun here was in Warren's claim that every tee shot whizzing out from the camera was good for 250 yards!

E. J. Bryan Discusses Traffic Situation

E. J. Bryan, traffic manager of the Wisconsin Paper Mills, spoke at the Monday, November 2, meeting of the Middle West Division of the Salesmen's Association of the Paper Industry. Mr. Bryan gave an interesting discussion on the recent decision of the Interstate Commerce Commission in regard to the 15 per cent freight rate demands of the railroads. Mr. Bryan indicated that the next turn of events was largely problematical and rested either with a new plan to be proposed by the railroads or the efforts of the roads to cooperate with the present controversial plan. General information as to the traffic situation formed a part of Mr. Bryan's interesting remarks.

J. W. Butler Paper Co. Promotes G. C. Cobean

George G. Cobean, of the J. W. Butler Paper Company, Chicago, has been advanced to the position of vice-president and general manager. Mr. Cobean was formerly with the sales staff of the Butler organization. He fills the position left vacant by the resignation of E. A. Julius, who has, for some time, been vice president and general manager of the Butler company. Mr. Julius will enter the advertising agency field in the newly organized firm of Julius-Glidden-Chase & Hooker. Mr. Hooker was formerly advertising manager of the J. W. Butler Paper Company up until about eight years ago. He has been connected with the firm of Hurja-Chase-Hooker, of which the new firm is an outgrowth. Mr. Julius was chairman of the Fine Paper group of the Chicago Association of Credit Men, resigning from that office at the same time that he severed connections with the Butler organization.

Retires Tonawanda Preferred

The Tribune Company, publishers of the *Chicago Tribune*, has retired $680,600 of the preferred stock of its subsidiary, the Tonawanda Paper Company. The entire issue of $1,000,000 recently was called for redemption. It is expected that the remaining $319,400 of the issue will be retired by January 1, next.

Elect Officers at Holyoke

HOLYOKE, Mass., November 3, 1931—The Connecticut Valley Division of the American Paper and Pulp Mill Superintendents' Association has elected these officers: Chairman, A. B. C. Drew of New Bedford, Mass.; Vice Chairman, Claude H. Smith of Holyoke; Second Vive Chairman, Ernest W. Bush of Holyoke; Third Vice Chairman, Richard F. Driscoll of Lee, Mass.; Secretary-Treasurer, Forbes Wood of Holyoke.

NATIONAL USS

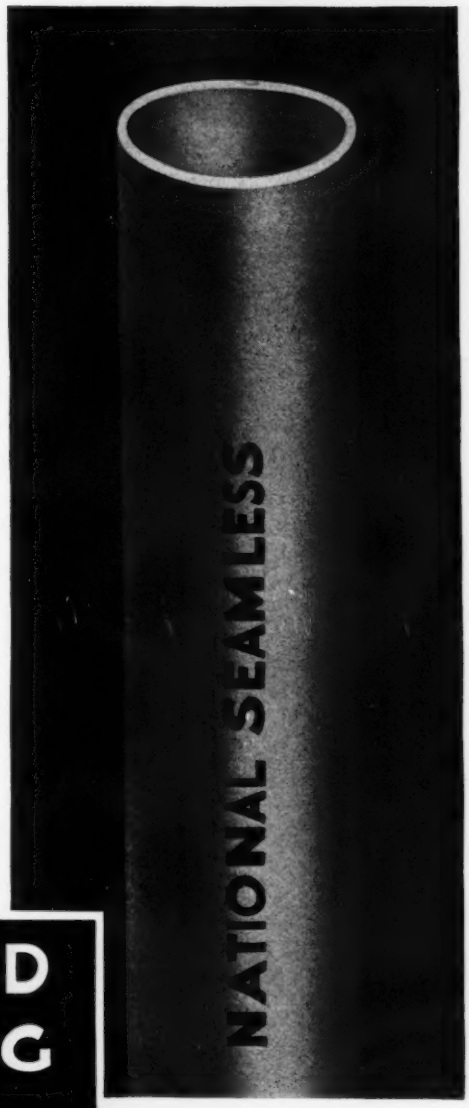
FOR the absolute reliability demanded of tubular material in paper plants it is necessary to surround production with all possible safeguards. The integrity of such a product must be unvarying; and every factor that might influence it must be kept under definite control.

Those responsible for the installation of tubular material in paper plants may be sure that the long experience, thorough organization, and modern facilities of National Tube Company are fully brought to bear in the making of U S S Stainless and Heat-Resisting Pipe and Tubes.

Where resistance to corrosion, improved strength at high temperatures and protection from certain acids are important, U S S Chromium-Nickel Alloy Steel Pipe and Tubes should be given careful consideration.

Our metallurgists, chemists, and engineers are at your service at any time to help in solving your particular problem and to suggest the best application of tubular material for the purpose that you have in mind.

USS 18-8 CHROME-NICKEL—USS 17 CHROMIUM
U S S 12 CHROMIUM



STAINLESS AND HEAT RESISTING STEEL PIPE and TUBES

U S S Chromium-Nickel Alloy Steels are produced under the licenses of the Chemical Foundation, Inc., New York; and Fried. Krupp A. G. of Germany

US STEEL

NATIONAL TUBE COMPANY
Frick Building, Pittsburgh, Pa.

QUALITY PRODUCTS — Dependable Service

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES

American Bridge Company
American Sheet and Tin Plate Company
American Steel and Wire Company
Carnegie Steel Company
Columbia Steel Company
Cyclone Fence Company
Federal Shipbuilding and Dry Dock Company
Illinois Steel Company
Minnesota Steel Company
National Tube Company
Oil Well Supply Company
The Lorain Steel Company
Tennessee Coal, Iron & R. R. Company
Universal Atlas Cement Company

Pacific Coast Distributors—Columbia Steel Company, Russ Building, San Francisco, Calif. *Export Distributors*—United States Steel Products Company, 30 Church Street, New York, N. Y.

Ontario Paper Manufacturers Fairly Active

Both Fine and Coarse Paper Mills Increase Operations Slightly—Some Improvement Noticed In Demand for Various Grades of Paper Board—Toronto Paper Distributors Experience Better Request for Wrapping Paper and Paper Bags

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, November 9, 1931.—Although the wholesale paper market in Ontario continues somewhat spotty the volume of business has increased some during the past couple of weeks and there is a better tone to the situation generally. For instance there has been a distinct improvement in the wholesale coarse paper trade where the tendency has developed to place orders of larger individual volume. Wholesalers are now taking orders for car lots and in one case at least a Toronto paper house specializing in coarse papers has booked orders for three car lots within the past ten days. Business is picking up in retail circles in centres like Toronto and this is causing increased sales of wrapping and paper bags, although the volume has not yet got back to normal proportions.

In the fine paper section the lower grade papers still have the centre of the stage and are in good demand, although there has been some improvement in the call for coated papers. Book and litho papers are enjoying good sale and the fine paper wholesalers all round are gradually increasing their sales. Some slight betterment in the paper converting market has been recorded of late and manufactured stationery lines are moving a little better, while envelope manufacturers report a slightly better market than has existed for some time past. Light weight papers are in fair demand and both the mills and the distributors are enjoying good business despite continued competition from outside sources. Improving business conditions generally has resulted in quite a fair call for glassine, waxing and grease proof paper lines and these are being sold in fair volume.

The manufacturing end of the paper industry is fairly active and mills for the most part are well employed. Slightly increased activity has been noted in both the fine and coarse paper sections and only in a few instances has there been any difficulty of late in keeping the machines operating. The board market is none too satisfactory as far as the Toronto plants go, although there has been some improvement in demand and in the case of one or two of the mills in the country operations are being carried on close to capacity.

Big Power Development Within Estimates

Rumors that construction of the big plant of Ontario Public Service Corporation at Abitibi Canyon, which is a wholly owned subsidiary of the Abitibi Power and Paper Company, is costing more than estimates and is behind schedule, appear to be without foundation. Cost of construction to date has been well within earlier estimates and construction schedules are right up to the minute, company officials claim. The Abitibi Canyon development is different from any other yet undertaken in Canada and costs cannot be forecasted to the dollar. There is no reason for doubt, however, that on completion of the enterprise expenditures will be well within aggregate estimates.

It is pointed out that Abitibi is deriving important benefits from the existing premium on United States funds. A premium of 10 per cent. means a difference of slightly more than $5 per ton in the prices of news print sold. In the case of the Abitibi company, however, this advantage is offset to a material extent by the increased cost involved in materials the company has to purchase in the United States, including coal and sulphur and interest on those bonds which are payable in United States funds.

Paper Displayed to Advertisers

At a meeting of the Advertising and Sales Round Table of Toronto at the Royal York Hotel on October 26 there was an impressive display of advertising methods and achievements. Among those in the pulp and paper industry exhibiting were the Howard Smith Paper Mills, the Don Valley Paper Mills and Provincial Paper, Ltd., each of which showed most attractive and well arranged specimens of all their best lines of manufacture. Paper merchants exhibiting were Bunti-Reid Company, which showed specimens of high grade paper and stationery for commercial, de lux and private use, and the Fred W. Halls Paper Company, which exhibited a most comprehensive collection of fine papers, all of which were made in Canada. There was a banquet and an address by Canada's Minister of Trade and Commerce on "How Is Business" featured the gathering.

Abitibi Power and Paper Company constitutes one of the dominating factors in the paper industry of Canada, representing about 25 per cent. of the country's output. Approximately 95 per cent of its total production is disposed of in the United States. The original mill of the company at Iroquois Falls has for many years been recognized as one of the most efficient and lowest cost mills on the continent, and the record of the company prior to the unfortunate developments of the past two years was one of the most impressive in the Canadian pulp and paper fields. In 1927 the company acquired the properties of the Mattagami Pulp and Paper Company and in 1928 absorbed the Spanish River Pulp and Paper Mills, along with a chain of news print companies formerly controlled jointly by Fort William Power, Manitoba Paper Company, St. Anne Paper Company and Murray Bay Paper Company. The combined mills have a normal capacity of 2,200 tons of news print, 215 tons of bleached sulphite, 150 tons of news sulphite and 65 tons of board and wrapping paper.

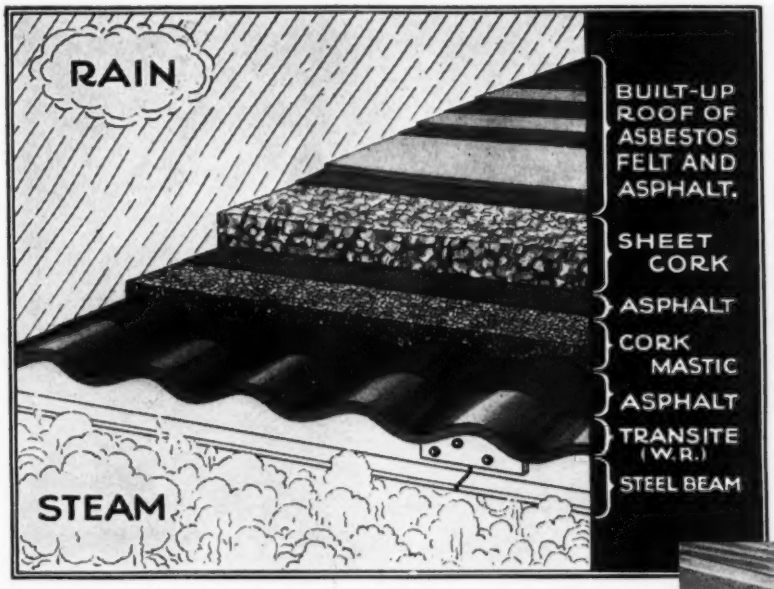
Notes and Jottings of the Trade

The Alliance Coater, the house organ of Alliance Paper Mills, Toronto, has made its appearance this month in birthday form. Established a year ago the paper has come to be looked forward to by the printing and paper trades as a disseminator of useful information. The anniversary number is double the regular size and contains a lot of interesting letter press.

During a heavy storm the big smokestack of the Barber Division mill of Provincial Paper, Ltd., at Georgetown, Ont., was blown over and has now been replaced by a steel structure.

Charles Price, Frank Thorne, and Superintendent Hawkins, of Price Bros., Ltd., Quebec, were recent business visitors in Toronto.

F. S. Duncan, president of Provincial Paper, Ltd., Toronto, left for the north a few days ago to join others in the paper group on the annual deer hunting expedition.



WATERPROOF INSIDE AND OUT

The J-M Built-up Roofing makes this roof waterproof outside—the Johns-Manville (W. R.) Transite underdeck makes this roof waterproof inside. Thus the J-M Insulated Rot-Proof Roof keeps its high insulating value and will give you complete protection from repair expense.

An insulated roof that is rot-proof *inside and outside*

...THIS TRANSITE DECK DOES IT—

IT has remained for Johns-Manville to present to the Paper Industry an insulated roof that has a roof deck *impervious* to moisture.

You know the value of scientific roof insulation. It ends roof drip. It brings you a return in hard cash by eliminating the necessity of undue expenditures for air conditioning and ventilating apparatus. And it brings an indirect return by improving working conditions in your plant.

But unless your roof deck is impervious to moisture, the best insulation you can apply to your roof will soon become a soggy mass, its value nullified and costly replacements eventually made necessary.

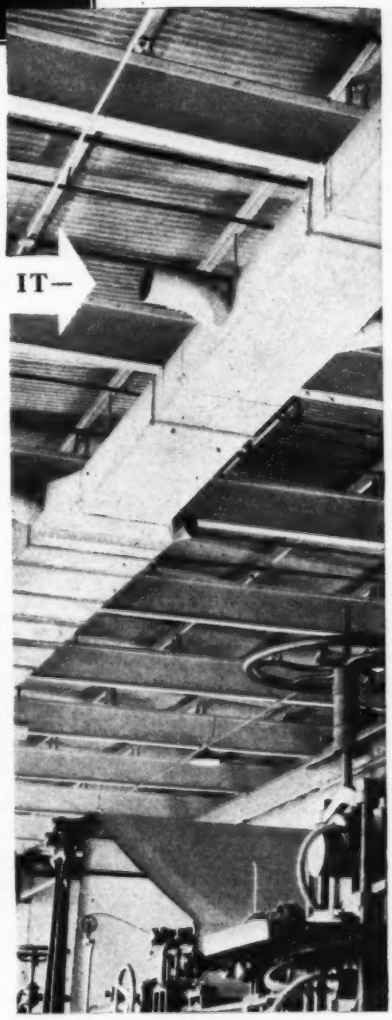
The deck of the J-M Insulated Roof is made of specially treated imperishable J-M Transite—rot-proof, fireproof, rust-proof and acid-resisting.

This Transite deck permanently protects the insulation against the steam or high humidity in the machine room—makes the J-M Insulated Roof doubly effective—protected inside and outside.

* * *

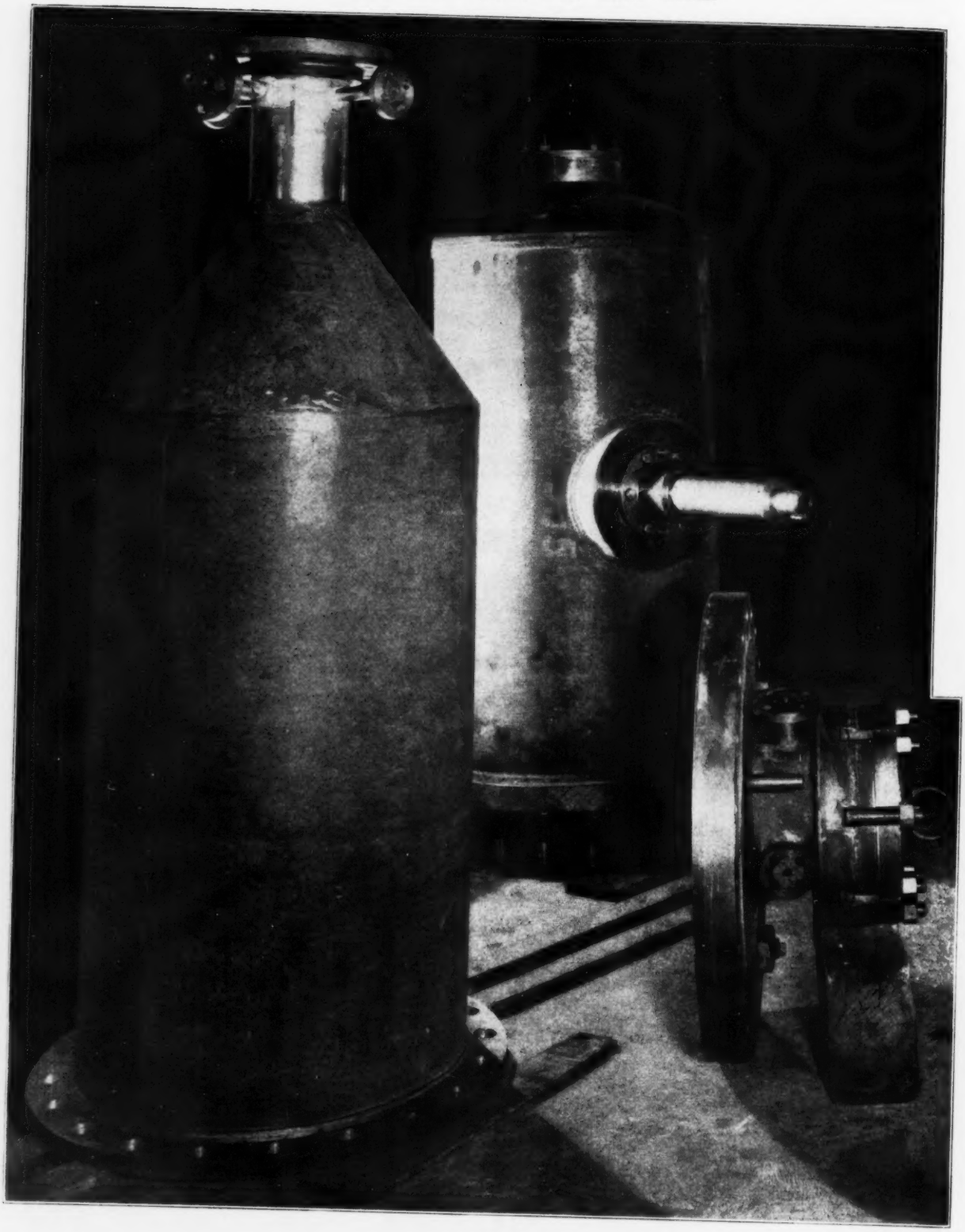
JOHNS-MANVILLE has facts and figures of typical installations to show the economy of J-M Rot-Proof Roofs in preventing condensation in the paper machine room. What Johns-Manville offers you is a *complete* roof, especially designed to reduce costs in paper mill service.

It is fully described in our booklet—"Controlling Condensation—M35." Send to the nearest office for your copy or address Johns-Manville, 292 Madison Ave., New York.

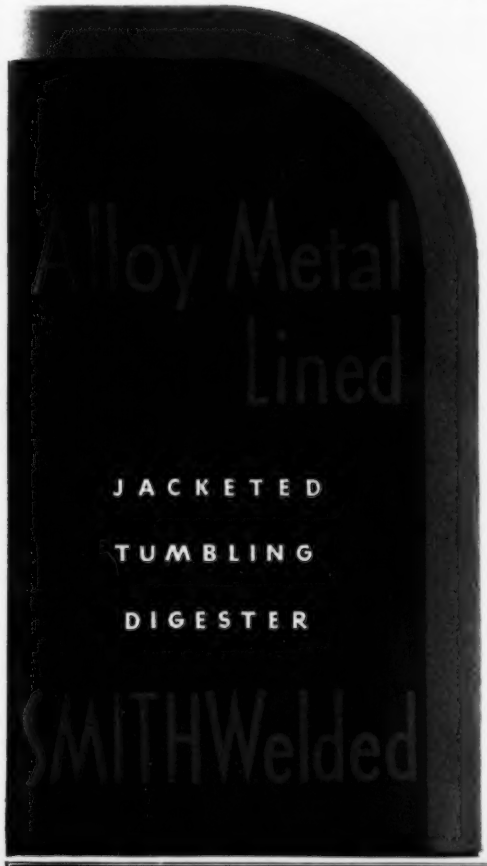


THE ATTACKS OF MOISTURE from within this paper machine room of the Fitchburg Paper Co., Fitchburg, Mass., ruined the former roof and destroyed its insulating value. In replacing the old roof with a J-M Insulated Rot-Proof Roof this company has put an end to repairs and expense. This photograph shows the underside of the protective Transite deck.

Johns-Manville *Insulated Rot-Proof Roofs*



SMITHWELDED



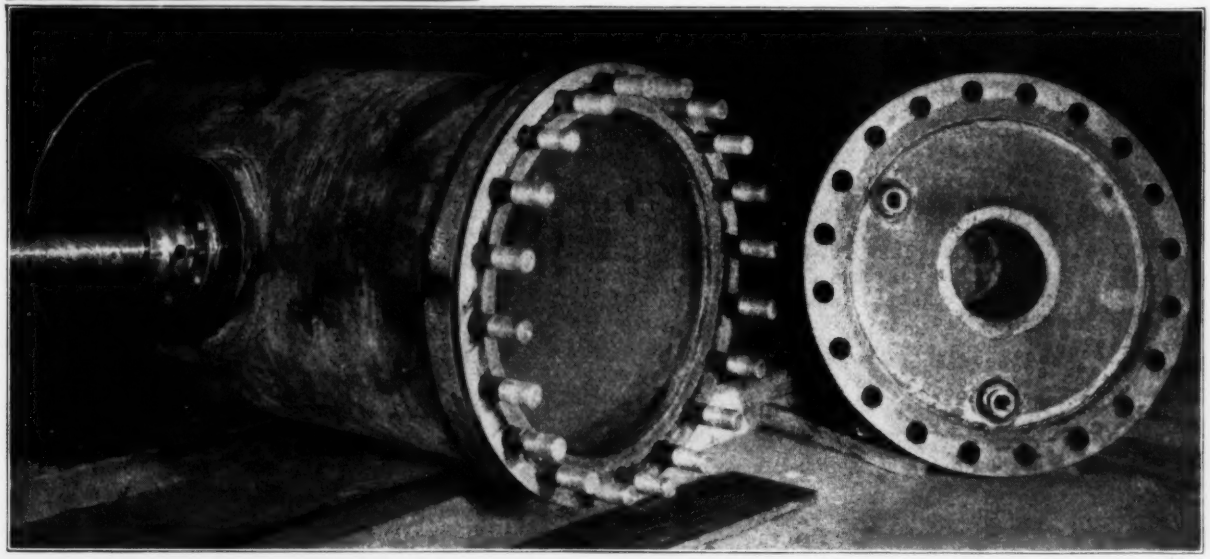
This little Digester, about 6 feet long, is one of several developed and built by this Company for the leading paper pulp laboratories.

Its construction is unique as compared with the brick lined digester in that it can be tumbled and externally heated. These novel features are made possible by SMITH*Lining* with alloy metal.

The metallic lining offers possibilities of utilizing the *same* digester for *different* processes, and can be duplicated in large commercial size vessels.

A. O. SMITH CORPORATION

General Offices: Milwaukee, Wisconsin · PRESSURE VESSEL DIVISION



The SMITH*Lined*-SMITH*Welded Vessel shown at extreme left fits into the vessel next to it, forming the Jacketed Tumbling Digester shown on this page.*

SMITH*LINED*

Consolidated Paper Corp. Effects Economies

Reorganized Canada Power & Paper Corp. Switches Operations Between Various Mills—Some Machines Previously Operating Are Being Closed Down, While Other Machines Which Have Been Inactive Are Resuming Production

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., November 9, 1931.—The final meeting of subsidiaries of the Canada Power and Paper Corporation for the legal formalities in connection with transferring the whole concern to the new Consolidated Paper Corporation was successfully concluded on Friday last, and a new chapter commences in the history of what were once Canada's outstanding news print producers.

More than twenty meetings have been held to have the various classes of security holders register, by vote, their approval of the plan of reorganization sponsored by the Securities Protective Committee, of which the Hon. Charles A. Dunning was chairman. With two exceptions, all of the meetings were without color or argument and in each of the two cases opposition was overwhelmingly outvoted.

Consolidated Paper Corporation has already taken important steps which will result in considerable operating economies. There has been some switching of operations between the various mills, some machines previously operating being closed down and other machines which had been inactive resuming production.

Plans have been completed, it is understood, for the concentration of clerical staff in Montreal. It will be remembered that, following the entry of Mayagamack and Port Alfred into the merger, the staff of the latter, which had previously been located in Montreal, was moved to Three Rivers, where the Wayagamack staff was already located. Now the staffs of both of these units are being brought to Montreal, and the executive and general offices of the combined organizations will henceforth be housed under one roof.

Another move of the new management has been the entire closing down of the New York sales office which has been maintained for some time. It is estimated that this action will result in a material saving in distribution costs of the new corporation.

It is reported that, due to the fact that existing headquarters in Montreal are inadequate for the housing of the combined staffs, the general offices of the new company will be moved from their present location in the Canada Cement Building to the palatial new Sun Life Building here.

British Election May Benefit Lumber Trade

Hopes are expressed by leaders in the timber industry here that with the advent of the National Government to power in Great Britain there will be a curtailment of the imports of Soviet lumber, with the result that Canadian lumber will regain its position in the British market.

England is the largest wood-importing country in the world, imports of wood and wood manufactures during 1927 being valued at approximately $277,000,000. Next to the United States, Canada is the largest exporter of wood. In regard to soft wood, Canada's exports are almost equally as large as England's imports. In case this appears to be the result of an intra-Empire arrangement, it must be pointed out that fully 86 per cent. of the Canadian export goes to the United States, and that England's soft wood imports come mostly from Northern Europe, foreign countries supplying 92 per cent. of the demand. Russia has recently been dumping and thus depressing prices of the countries supplying the British market, the United States ranks third, being surpassed only by Finland and Sweden.

Canada's wood export for 1929 is as follows:

	England Value $	United States Value $	All Countries Value $
Saw mill products and pulpwood	$ 8,501,878	$72,312,271	$91,675,675
Pulp	1,785,053	36,941,595	44,895,717
Manufactured wood	401,672	53,795	842,235
Paper	10,964,961	124,898,461	148,394,868
Total wood, wood products and paper	22,350,947	235,665,010	288,621,745

The value of England's imports from the United States during 1927 amounted to $42,000,000, or slightly over 15 per cent. of the total British wood imports, which is practically the same percentage as obtained in 1913. The actual volume, however, is materially less, owing to the appreciation in values that have taken place since that time. In point of value the United Kingdom is the most important foreign lumber market of the United States, taking during 1926 over 185,000,000 feet of hard-wood lumber, valued at $13,500,000, for use by the furniture, interior fixture and fitting, and motor vehicle industries. In addition to hard woods about 128,000,000 feet of soft woods, principally southern pine, Douglas fir, and spruce, are also exported annually to that market for use where large sizes or special qualities are required. Approximately 80 per cent. of the mahogany lumber imported by the United Kingdom is supplied by the United States, it being manufactured here from logs imported largely from Central American countries.

A tremendous agitation for Empire trade has, the last few years, been launched in England and all over the British colonies. Lumber has not been overlooked in this campaign being conducted by the Empire Marketing Board to further the greater use of Empire products, attention having been drawn to Indian, Australian, and native woods for furniture, interior panels and finish of dwellings, railroad cars, steamer saloons and staterooms, and also to soft woods, particularly Douglas fir and spruce from Canada.

It is expected that this agitation will now bear fruit, to the great benefit of Canada.

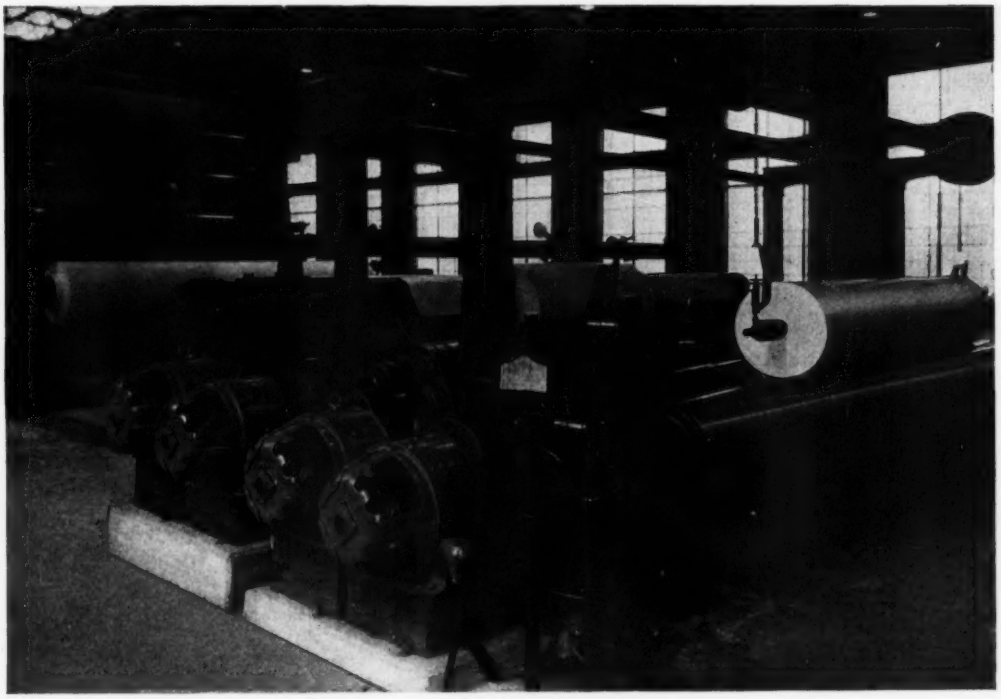
Mersey Mill Operating Near Capacity

Operations of Mersey Paper Company, which came into operation late in 1929 as the first news print producer in Nova Scotia, has been in marked contrast with those of the majority of its contemporaries.

Earnings in 1930 were sufficient to cover depreciation, bond interest and loans and leave a surplus of $172,702; expectations are that production for 1931 will amount to 77,000 tons, which would keep the plant operating at capacity throughout the year.

The relatively favorable situation which surrounds Mersey Paper emphasizes the advantages of the all-water shipping route from this Nova Scotia plant, compared with the rail and water routes of the mills operated in Quebec and Ontario. By reason of its low-cost transportation facilities, the company has been able to compete for business on an advantageous basis.

The mill is located at Liverpool, N. S., about 485 miles



Electrically driven 4-drum Winder—20″ dia. drums, 216″ face
Ordered by Mead Straw Pulp Co., Chillicothe, Ohio.
(Motors furnished by Reliance Electric Co.)

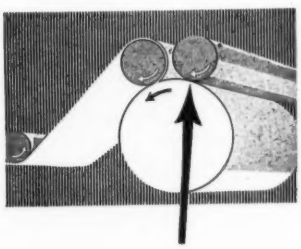
USE "M & W" FOUR-DRUM WINDERS

and wind the kind of rolls that your customers prefer.

Catalog just off the press describes them fully. Send for it today.

Not constant speed but constant

PULL



Definite, Dominant Winding Efficiency

A HARD roll centre for safe handling—Slightly *decreasing* hardness toward the outside, to prevent shrinking and welting in the customer's hands—

And this slight decrease accomplished *automatically,* by the nature of the drive itself, instead of by frequent skilled manipulation—

That is the everyday service which the users of M & W electrically-driven Four-Drum Winders have learned to expect. They just start the rolls going, and the Winder "runs itself."

The saving in labor, and the gain in quality of product, will be appreciated by every mill superintendent.

THE MOORE & WHITE COMPANY

Established 1885

PAPER MACHINE BUILDERS

15TH ST. & LEHIGH AVE. PHILADELPHIA, PA.

by water from New York. The S. S. *Markland,* a company-owned steamer, specially constructed for transportation of news print, is in regular communication with New York and is capable of carrying 4,000 tons in one shipment; customers in New York include the *New York Herald-Tribune,* the *Times, World Telegram, American,* and *Journal.*

Satisfactory Returns

All of the 1931 output has been sold at a price which will bring satisfactory return to the company and contracts have been negotiated covering the plant's output for the next ten years, according to Colonel C. H. L. Jones, president of the company. Thus, though Mersey Paper was formed at a time when the news print industry was in an unsettled state, it has so far been able to survive the difficulties which have been severely felt by many other news print producers.

Donnacona Mill's Good Showing

Operations of Donnacona Paper Company, Ltd., for the current fiscal period, are stated to be at a higher percentage of capacity than the general average obtaining in the industry.

Sales of Donnacona Insulating Board are reported to have shown steady increases since April, during which month they topped the levels for the corresponding month of 1930.

It is pointed out that the news print contracts of the company stipulate payment in New York funds. This is equivalent to an additional profit of $5 a ton at the ruling rate of exchange.

Belgo Using Six Machines

Six of the eight machines of the Belgo Company, a subsidiary of Consolidated Paper Corporation, are being used at present and are turning out 450 tons of news print per day. The Port Alfred mill is understood to have reopened, but it is not known whether or not this unit is splitting the business with Belgo, or because of increased orders.

Racquette River Entertains Paper Men

[FROM OUR REGULAR CORRESPONDENT]

POTSDAM, N. Y., November 2, 1931.—A large delegation of paper men were the guests of the Racquette River Paper Company last week at its woods camp at Granshue in the heart of the Adirondacks where deer hunting is to take up a considerable part of the time. Among those in the group are Major Robert L. Gray, of the Gray Envelope Company, Brooklyn; B. S. Oles and Wallace Oles, of the Oles Envelope Company, Baltimore; James S. Wiley, Berlin & Jones Company, New York; H. J. Severance, Hubbs & Howe Company, Buffalo; George E. Beggs, of Hubbs & Hastings Paper Company, Rochester; W. H. Lippman, Judd Paper Company, Holyoke, Mass.; William E. Ebbets and Robert H. Coy, of Coy, Disbrow & Co., New York; J. C. Mallalieu and J. F. Levens, of the George W. Millar & Co., New York; J. J. Price, General Paper Goods Manufacturing Company, Brooklyn; E. A. Eaton, of the A. M. Eton Paper Company, Boston; Theodore Robinson, of Baxter, Lane Paper Corporation, Providence, R. I.; Fred McNicoll and Donald F. McCall, representatives of the Racquette River Paper Company in the New York office. The following men from this section were included in the delegation: Dr. John P. Brooks, president emeritus of Clarkson College; Charles H. Sisson, Frank T. Sisson, R. L. Sisson, Jr., George W. Sisson, Jr., and James E. Arnold.

TO SPREAD EMPLOYMENT

(Continued from page 11)

"The paper industry of Green Bay employs between 1,800 and 2,000 people, with an estimated payroll of $2,250,000. Sales of the respective mills approximate $12,000,000, of which 92 per cent is sold out of the state of Wisconsin. The paper industry in this city pays to the railroads approximately $1,000,000 in freight.

"The industry has been rather fortunate locally during this period of depression. While the plants have not been operated to full capacity, it is estimated that they have operated between 75 and 85 per cent, which has been of material assistance in keeping Green Bay in much better condition than a good many sister cities in this and other states."

News of the Industry

Shipment of pulp from Sweden direct to the docks of the Nicolet Paper Company, DePere, Wis., was accomplished for the first time last week. The steamer *Mauritz* arrived after a two months' journey bringing 1,400 tons of baled pulp which was transferred directly to the mill. Quite a number of direct shipments from Sweden have arrived for various Wisconsin mills of late.

An emergency fire department of twelve men has been organized at the Menasha Products Company, Menasha, Wis. The men are being trained by the city fire chief and will be in readiness to function in case of fire, until the city department arrives.

An estate of $1,203,821.94 was left by the late Henry K. Babcock, of Neenah, Wis., former vice president of the Fox River Paper Company, Appleton, Wis. He left no will and the entire estate therefore is left to his widow, Mrs. Fanny L. Babcock. Inheritance taxes amounted to $116,301.32.

Establishment of a factory at Appleton, Wis., to manufacture wood plugs for paper rolls is in progress by Arthur L. Herwig, formerly production manager of the Wood Fibre Plug Company, Menasha, Wis. A company is in formation and will take over a location formerly occupied by the Advance Car Mover Company. The buildings will be remodeled at once for the new enterprise. About twenty men will be employed under normal conditions.

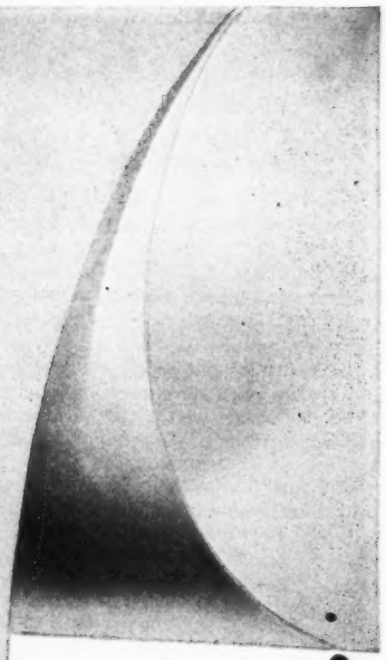
The paper mill bank of the Fox River Valley, the First National of Appleton, Wis., last week became virtually a ten million dollar institution. The Citizens National bank was merged with the First National, and the addition of assets of $2,360,000 of the former brings the total for the latter approximately to $9,500,000. Richard S. Powell is president, and F. J. Sensenbrenner, president of the Kimberly-Clark Corporation is vice president.

New Plant for Cloquet

[FROM OUR REGULAR CORRESPONDENT]

DULUTH, Minn., November 6. 1931.—Extension of the operations of the Bernst, Forster & Dizfield Company at Cloquet to include the construction of a new plant and the employment of 250 additional men has been announced by Herbert Dickman, superintendent and manager. Work on a two-story brick building, 280 by 110 feet, which will cost $300,000, will be started immediately and active operations in the plant are scheduled for early spring. The company has acquired several patents for the molding of pulpwood and the making of dishes, pie plates and similar articles. Spruce will be used for the molding process. The executive offices of the company are in the Grand Central Terminal, New York.

Felts



your Product!

Equipment necessary for you to make a good product must give efficient performance and service. This applies to felts the same as other equipment. For real service they must be made for the definite requirements of the mill.

Appleton Felts are made for each customer. Designed with technical foresight as quality products, all Appleton Felts and Jackets are made as definitely uniform as a plant can make them. Whether two or twenty, they are alike—due to an absolute check of every manufacturing operation.

Today using Appleton Felts and Jackets is regarded as one real way of a mill's assurance of quality and service—with the satisfaction that comes from a job well done. Let us help you solve your felt problems.

APPLETON WOOLEN MILLS, *Appleton, Wis.*

Appleton
Felts and Jackets

Glassine Trade Customs

The following trade customs have been adopted by the Glassine Division of the American Paper and Pulp Association, effective November 14, 1931:—

1—BASIS WEIGHT:
The term "basis weight" as used herein shall be defined as:
"The weight in pounds of 500 sheets of a size 24 inches by 36 inches.

2—MARKING:
Each package if marked, shall be stencilled or labeled by the manufacturer with the actual contents, size, basis weight and count.

3—CORES, PLUGS AND WRAPPERS:
On ream wrapped paper, the weight of the paper including the ream wrapper shall be taken as the Net Weight. No allowance shall be made for the weight of cores, plugs and wrappers on Glassine Paper in rolls or bundles. Returnable cores should be deducted from weight and charged as separate item. Frames, cases and cartons should *not* be included in Net Weight.

4—ACCEPTANCES:
Acceptances of orders are contingent upon uncontrollable causes of delay or prevention.

5—QUOTATIONS:
Quotations, unless otherwise stated, are for prompt acceptances and are subject to change without notice. All quotations shall be made on a basis of scale weight.

6—DIFFERENTIALS:
A-Except in the case of sales for export, prices shall include cost of all types of packing.
B-Prices shall be the same for both sheets and rolls, except rolls of less than 3" in width, for which there shall be an extra charge.
C-Prices quoted shall apply to orders of 500 pounds or over. A differential of 2c per pound shall be charged on all orders not amounting to 500 pounds.
D-Prices quoted for each grade shall be the same for all basis weights from 25 pounds to 40 pounds inclusive. A differential of not less than 1½c per pound shall be added to this price when a paper of the same grade is required but of a basis weight of less than 25 pounds. This differential shall not apply in the case of special grades such as window envelopes, etc.

7—CARLOAD LOTS:
Unless otherwise specified a carload of paper shall be considered at 36,000 pounds or not less than the minimum carload weight specified in the railroad regulations, at the point of shipment.

8—"MAKE AND HOLD" ORDERS:
All "make and hold" orders must specify an ultimate date of shipment at which date goods are to be billed and the invoice taken to account by the customer, whether goods are ordered shipped or not.

9—ROUTING OF SHIPMENTS:
Shipments will be routed at carrier's option unless otherwise specified by customer.

10—DEVIATIONS FROM BASIS WEIGHTS:
A delivery of plain or embossed Glassine, which averages not more than 5% over or under the specified basis weight, shall constitute a good delivery on an order and shall not be subject to rejection or allowance on that account. All billings shall be made on a basis of scale weight.

11—VARIATION ON QUANTITY ORDERED:
Over-runs and under-runs shall be accepted subject to the following possible variations, which shall constitute a good delivery and be accepted by purchaser as such.

Less than 5,000 pounds—20% over or under
5,000 " not exceeding 10,000 pounds —15% over or under
Over 10,000 " —10% over or under

When quantities are definitely limited, the combined variation shall apply above or below the limit specified. For instance, in the case of an order for "not less than" 5,000 pounds, a delivery of "not more than" 7,000 pounds, and in the case of one for "not more than" 5,000 pounds a delivery of "not less than" 3,000 pounds shall constitute good delivery.

12—DELIVERY POINT:
Delivery Point is on board cars at place of manufacture.

13—CANCELLATIONS OR CHANGES:
Cancellations or changes on any paper being specially made to order will be accepted only if the paper is not actually in process of manufacture, or made at the time of the receipt of notice regarding the cancellation or change.

14—CLAIMS:
For the mutual protection of both buyer and seller, it is agreed that:
A-No claims shall be allowed after paper has been converted. However, experience has shown that exceptional cases occasionally arise where the fault is clearly with the mill and where an absolutely literal enforcement of Custom No. 14 would work injustice and hardship to the buyers. It is, therefore, understood that mills will enforce the spirit of this Custom deciding exceptional cases upon their merits and according to the rules of equity.
B-Claims for loss, shortage or damage in transit will be dealt with in conformity with the bill of lading.

15—TERMS OF SALE:
Settlement for all sales shall be made not later than 31 days after date of invoice. When a settlement is made not later than 30 days after date of invoice a cash discount of 2% shall be allowed on the amount billed for paper. When several invoices fall due in any month, the date of payment shall be figured from the average date of said invoices.

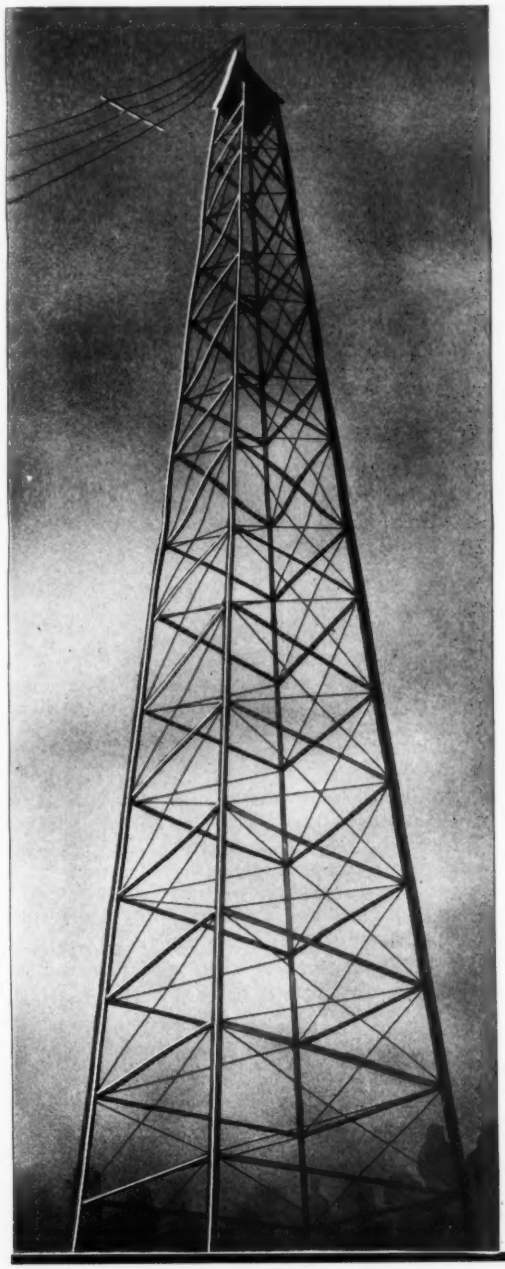
The following mills are members of the Glassine Division of the American Paper and Pulp Association:—Deerfield Glassine Company, Monroe Bridge, Mass.; Glassine Paper Company, West Conshohocken, Pa.; McDowell Paper Mills, Manayunk, Philadelphia, Pa.; Nicolet Paper Company, De Pere, Wis.; Riegel Paper Corporation, Milford, N. J.; Rhinelander Paper Company, Rhinelander, Wis.; Thilmany Pulp and Paper Company, Kaukauna, Wis.; Westfield River Paper Company, Russell, Mass.; *Chairman*, J. H. Neal. *Secretary*, Thomas J. Burke.

S. L. Willson Club Meets

The S. L. Willson Club held its first meeting for the 1931-32 season on October 28 at the general office of the American Writing Paper Company, Holyoke, Mass.

W. J. Norton, treasurer of the A. W. P. Company, gave a talk on the "Cost of Workmen's Compensation Insurance." John Seldon, safety engineer of the Liberty Mutual Insurance Company talked on accident prevention work.

Monthly meetings will be held for the balance of the season.



A SIGNAL FOR FAN BUYERS‹‹‹‹

U. S. Department of Commerce, Aeronautics Branch, Purchases 60 Propellair Fans for Government Radio Stations after Standard Code Tests Give It the Highest Rating of All Fans Submitted.

Catalog claims mean nothing when Uncle Sam goes shopping. They can be so easily proved or disproved in his famous test-shop, the Bureau of Standards, that no claim should be made that cannot be supported. It's the acid-test of a product's integrity...

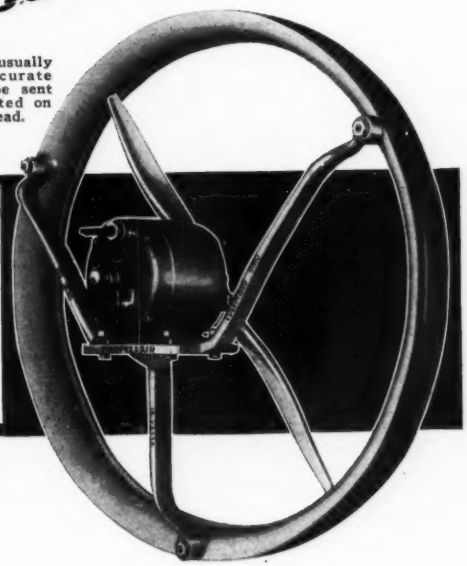
The Department of Commerce called for quotations on 60 ventilating fans, of a certain stated style and capacity. There were several bids—some with astounding catalog claims. *Propellair*, too, offered a fan for the task; but with a rating apparently low, since others were claimed so much better.

The distributor for *Propellair Fans* suggested that the Department have the Bureau of Standards make a test of all fans submitted, using the Standard Code Test of the American Society of Heating and Ventilating Engineers. This was done. *Propellair* came so near meeting its cataloged figures and ratings that its superiority could not be denied. As a result 60 *Propellair Fans* are now ventilating government radio stations.

A signal for fan buyers!... If it smacks of sincerity, let Propellair-Inc. assist you with your next ventilating task.

PROPELLAIR TRADE-MARK REG.

Propellair's unusually clear and accurate catalog will be sent you if requested on your letterhead.



PROPELLAIR-INC.

Airplane Propeller Exhaust and Ventilating Fans

COLUMBUS, OHIO

New York Trade Jottings

Arthur Herman, for some time past connected with the wood pulp department of Parsons & Whittemore, New York, has severed his connection with that organization. Mr. Herman plans to deal in sulphite, kraft and ground wood pulps, both foreign and domestic, in his own name, and until desirable facilities are located can be reached at 4508 40th street, Long Island City, N. Y., telephone Stillwell 4-8038.

* * *

The Paperboard Industries Association will hold its annual meeting at the Commodore Hotel, New York, on November 17, 18 and 19. In addition to separate meetings of the Paper Board, Container and Folding Box sections, a general meeting of the three groups will be held on Thursday afternoon, November 19. The annual dinner will be held at the Commodore Hotel on Wednesday evening, November 18.

* * *

Fall meetings of the Waste Paper Institute will be held in New York on November 16, 17 and 18. Important conferences will commence on Monday afternoon at the Institute headquarters, 1109 Times Building, New York. The Committee on Waste Paper Classification will meet preliminary to the conference with the Paperboard Industries Association on Tuesday morning, November 17, at the Hotel Astor.

* * *

The Joint Committee on Approved Pulp Testing Chemists for the Paper Industry of the United States, with headquarters at 370 Lexington Avenue, New York, has accepted as approved mill pulp testing chemists, and listed as such: Harvey P. Cannon, Container Corporation of America, Philadelphia Division, Manayunk, Pa.; N. W. Coster, Puget Sound Pulp and Timber Company, Everett, Wash.; and Lawrence Taylor Ross, Union Bag and Paper Corporation, Hudson Falls, N. Y. The Committee has also accepted Aug. C. Orthmann, the Orthmann Laboratories, Inc., 647 West Virginia street, Milwaukee, Wis., as an approved commercial pulp testing chemist, and he has been listed as such.

* * *

Corn Products Refining Company, manufacturers of paper making starch, etc., of 17 Battery Place, New York, reports net income of $7,553,719 for the nine months ended September 30, after all charges, being equal to $2.46 a share on 2,530,000 common shares after preferred dividends, and comparing with $10,170,342, or $3.50 a common share, in the like period of 1930. For the third quarter of this year, the net was $2,059,453, or 64 cents a common share, which compared with $3,104,887, or $1.05 a common share in the preceding quarter, and with $3,529,081, or $1.22 a share, in the third quarter last year. The decrease in earnings in the third quarter this year was due largely to inventory losses.

* * *

R. S. Kellogg, secretary of the News Print Service Bureau, was the guest speaker at the regular weekly luncheon and meeting of the Eastern Division of the Salesmen's Association of the Paper Industry, held at George's Restaurant, New York, on Tuesday. Mr. Kellogg recently competed a study of the relationships between newspaper circulations, literacy and urban population and discussed the results of this study. Comparing the growth of population in the various states during a ten year period and the increase of literacy during this time, he drew the conclusion that the newspaper circulation increase experienced during the ten years was due to the latter factor, as it was greater than the increase in population. Mr. Kelloggs address was illustrated with a series of charts which he had prepared. There was an overflow attendance of members and guests to greet Mr. Kellogg and his interesting and instructive talk was thoroughly enjoyed by all present.

Fair Demand in Indianapolis

INDIANAPOLIS, Ind., November 10, 1931.—Little change is seen in local paper markets. Most of the dealers who were caught rather short of stocks of fine papers at the first of the school year have reordered and now have sufficient to keep abreast of the demand for some time without reordering. Prices hold fairly firm in spite of the low demand.

Just now the manufacturers of boxes in this state are beginning to push Christmas models. There will be a fair volume of business, they believe.

Building papers have been selling in fair volume, better than had been expected this fall and it is likely a fair demand will continue until cold weather. Much propaganda is being put out all over the state for remodeling and new construction which is beginning to bring results. The relatively low cost of construction now also is aiding in the movement.

All container factories in the state are working under reduced schedules and report lethargy in the demand. Demand for cellophane is fair but is slightly lower than a month or so ago. Cigar factories in this territory, virtually all of which use cellophane, have reported less demand and this has been reflected on the wrappers. Prices, however, continue firm.

News print demand is a little more active. Local jobbers say this is due to increased advertising of fall and winter merchandise, but a fair demand is expected to continue now through the holidays.

Paper stock is a drug on the market, only a few grades being in demand at all and these generally are plentiful. Prices are at a very low point.

May Reopen South Glens Falls Mill

GLENS FALLS, N. Y., November 2, 1931.—It is rumored here that the branch mill of the International Paper Company in South Glens Falls is to be reopened within the next few weeks although the reports could not be verified. Plans of the company are understood to call for resumption of operations in order to turn out a grade of news print now turned out in another branch plant in Northern New York and indication that there is some truth in the rumors was seen this week when it was learned that a number of officials had been summoned for a conference. Those that keep well informed on conditions in the industry declared that the machinery was in good condition when the suspension of activities occurred about two years ago and therefore could be started up without much preparation. It was learned that all equipment has been kept in place with the apparent belief that the plant would be reopened again.

The gossip concerning the future of the mill has gained widespread attention in this section and it is the general impression among local business men that a resumption of operations would be beneficial in many ways. The plant employs several hundred men when running at full capacity and even though only a portion of this number was recalled it is believed that a betterment in general conditions would result. There is also another report to the effect that the machines in the Corinth mill may possibly be replaced by a number of new ones that have more labor saving qualities.

$500
REWARD

will be paid to
the person
supplying me
or the local
police, with the
first information
leading to a
successful prosecution
of any person or firm
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PAPER TRADE JOURNAL

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Editor

Ronald G. Macdonald
Editor Technical Section

Herbert J. Laughton
Associate Editor

Thomas J. Burke, C. A.
Editor Cost Section

Reginald Trautschold, M. E.,
Power Engineering Consultant

Lynne M. Lamm, *Washington Correspondent*

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TAPPI AND EMPLOYMENT

One of the outstanding features of this year and last in the paper industry has been the stability of employment of technical men. The use of technically trained engineers and chemists in the pulp and paper industry began in a pronounced way immediately before the Great War. Slow progress was made at the start and following the war there was a real surplus of technical men who had to take any kind of jobs that were open in any industry. The depression of 1921 offered the first challenge to these men and a large number had to join the army of the unemployed.

The past ten years has witnessed many important changes in pulp and paper manufacture. Machines have been widened and speeded up, the vacuum drier and the suction roll have found greatly increased application, technical control has been generally adopted and manufacturing waste has been minimized. Throughout this period the demand for technical supervision has grown rapidly, at first by the more progressive companies and more recently by the industry at large.

The present economic period has demonstrated that the technically trained man is a definite and permanent factor in the industry, and it is believed that one of the great activating forces behind these changes has been the Technical Association of the Pulp and Paper Industry, an organization that started with a handful of men in 1915, in fact nearly all of the few men qualified for membership at that time, and has grown to be an association of about 1,200 individual members as well as of a large number of companies.

If ever a group has received a challenge as to its right to exist the past year or more should have furnished it. In the face of the present economic situation it is understood the Technical Assoication, which functions as a mirror to technical progress has continued to grow and has had an appreciable gain in membership even during 1931.

Much credit is due to the Technical Association for the splendid way in which it has successfully managed to keep its members employed. The industry is rapidly appreciating the service that the association is rendering as an employment clearing house, particularly for managers, superintendents, engineers and chemists. Such an organization merits the wholehearted support of the companies of the industry. Every man responsible for production volume and quality should be a member of TAPPI.

President Roosevelt once said that every man owes a portion of his time and interest to the upbuilding of the profession of which he is a part. There is no better way in which the superintendents and other technical men can contribute to their own general economic welfare than by being interested members of the Technical Association and participants in its worthy endeavors.

SWEDISH MILLS CANCEL AGREEMENT

A report to the Department of Commerce states that existing wage agreements in the Swedish pulp and paper mills have been cancelled effective January 1.

It is probable, says the report, that the Employers' Association will insist on lower wages, to which it is doubtful if labor organizations will agree, since the latter are claiming that the reduced value of Swedish currency will automatically reduce wages by 25 per cent. A conflict, the report states, seems inevitable, which may culminate in a lockout. Everything depends on currency developments between now and January 1. Any considerable change will necessitate a readjustment of wage scales.

The Swedish pulp market was extremely quiet following the suspension of the gold standard in the United Kingdom and by similar action later in Norway and Sweden according to a report to the Department of Commerce.

Such sales as were made were particularly to United States buyers, the depreciation in the Swedish crown facilitating sales. A tendency toward lower dollar quotations was perceptible, contracts for strong sulphite pulp having been concluded at $1.70 to $1.80 per 100 pounds ex dock. Quotations on strong sulphate remained unchanged at $1.50 to $1.55 for ordinary brands.

BUSINESS AND EMPLOYMENT

Two referenda carrying proposals for business and employment stabilization were sent out by the Chamber of Commerce of the United States today for a vote by its member organizations. One of the referenda will be taken on a report by the Chamber's Committee on Continuity of Business and Employment, and the other on a report by its Natural Resources Committee.

The report of the former committee analyzes conditions producing instability in business and in employment, and dwells upon means for preventing the excesses in business activities which bring general reversals and depression. The report proposes means under the anti-trust laws for promoting such stabilization of business activity as is in the general public interest, the setting up by business itself of a national economic council to aid all fields of business in their planning, establishment of privately sustained systems of unemployment and other benefits based upon definite reserves previously established, and other measures upon which the membership will vote. The report deals both with long-range problems and with the immediate situation.

The report of the Natural Resources Committee proposes relief in emergencies for the natural resource industries, such as coal, oil, and lumber, by setting up a government tribunal which would permit agreements for curtailment of production when in the public interest.

Bids for Government Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., November 4, 1931.—The Government Printing Office has received the following bids for 3,000 pounds of No. 1 gummed kraft paper: Reese & Reese, Inc., 7.7 cents and 6.95 cents per pound; Herbert Lindemeyr, 7.25 cents; R. P. Andrews Paper Company, 7.4 cents; Charles G. Stott & Company, 7.7 cents; Mathers-Lamm Paper Company, 6.945 cents and 7.83 cents; Virginia Paper Company, Inc., 8 cents; Old Dominion Paper Company, 7.29 cents; Walker Goulard Plehn Company, Inc., 7.36 cents; and Dobler & Mudge Company, 8.24 cents.

The Government Printing Office has received the following bids for 40,000 pounds of No. 2 quality binders board: Mathers-Lamm Paper Company, 3.085 cents per pound; Consolidated Paper Company, 3.15 cents; and R. P. Andrews Paper Company, 3.1 cents.

The Printing Office also received the following bids for 33,500 pounds of 75 per cent rag laid antique book paper: American Writing Paper Company, Inc., at 11.2 cents per pound; Whiting Paper Company, 12.75 cents; Whitaker Paper Company, 10.95 cents; Barton, Duer & Koch Paper Company, 11.25 cents; R. P. Andrews Paper Company, 12.2 cents; Mathers-Lamm Paper Company, 16.5 cents; Old Dominion Paper Company, 14,749 cents; Standford Paper Company, 12.375 cents; Reese & Reese, Inc., 14.85 cents; and Hawthorne Paper Company, 10.94 cents.

TAPPI Annual Meeting

The Waste Committee of the Technical Association of the Pulp and Paper Industry has announced its tentative annual meeting program for February 17, 1932.

There will be a symposium on Problems in Waste Utilization, in which the following papers will be presented: Effect of White Water Utilization on Sheet Properties, by E. R. Schafer, Forest Products Laboratory, Madison, Wis.; White Water Showers (author to be designated later); Foam Control, by E. F. Whittington, Sutherland Paper Company, Kalamazoo, Mich.; Shrinkage Reduced by Chlorination, by H. W. Richter, George O. Jenkins Company, Bridgewater, Mass.; Slime Control, by C. M. Baker, Engineer, A.P.P.A., Madison, Wisconsin. Discussion.

TAPPI Notes

D. R. Weedon, formerly sales manager for Hungerford and Terry, Clayton, N. J., is now treasurer and general manager of the Russell Manufacturing Company, Middletown, Connecticut, makers of brake linings, webbings, etc.

A. G. MacIntyre formerly sales manager for the Staley Sales Corporation and the New Haven Pulp and Board Company is now president of the Androscoggin Pulp Company, South Windham, Maine.

Carl Moe, chief chemist of the Minnesota and Ontario Paper Company, International Falls, Minn., since 1916, is now chemist at the Stevens Point Pulp and Paper Company, Stevens Point, Wis.

R. H. Dines of Wallace and Tiernan Inc., is now located at Albany, N. Y.

Clifford Swett, formerly chemist of the Escanaba Paper Company and the Albemarle Paper Company, is now located in West Peru, Maine. Mr. Sweet has made no definite plans for the future.

H. L. Joachim, formerly mill manager of the Manayunk, Pennsylvania, division of the container Corporation of America is now production manager of the Federal Board Company, Bogota, N. J.

Harvey P. Cannon, chemist of the Manayunk, Pa., division of the Container Corporation of America, has been appointed an approved pulp testing chemist by the Joint Committee, representing the A.P.P.A., A.A.W.P.I. and TAPPI.

Martin Sundell and Gustav Soderlund of Holmes Bruks A/B, Norrkoping, Sweden, are visiting American mills.

Lawrence F. Barsaloux, of 24 Walnut street, Hudson Falls, N. Y., formerly chemist for the Union Bag and Paper Company, has recovered from his recent illness and is interested in obtaining a position as chemist in a paper mill.

Ward D. Giles has resigned his position as boss finisher at the Albemarle-Chesapeake Corporation. Mr. Giles has made no definite plans and may be reached at Box 1, West Point, Va. He was formerly finisher at the Rumford, Maine, mill of the Continental Paper and Bag Corporation.

The German Technical Association (Verein der Zellstoff-und Papier Chemiker und Ingenieure) will hold its winter meeting December 3 to 5, 1931, in Berlin, Germany. An excellent technical program has been prepared and a special invitation is extended to any TAPPI member to attend the meeting.

New American Writing Portfolio

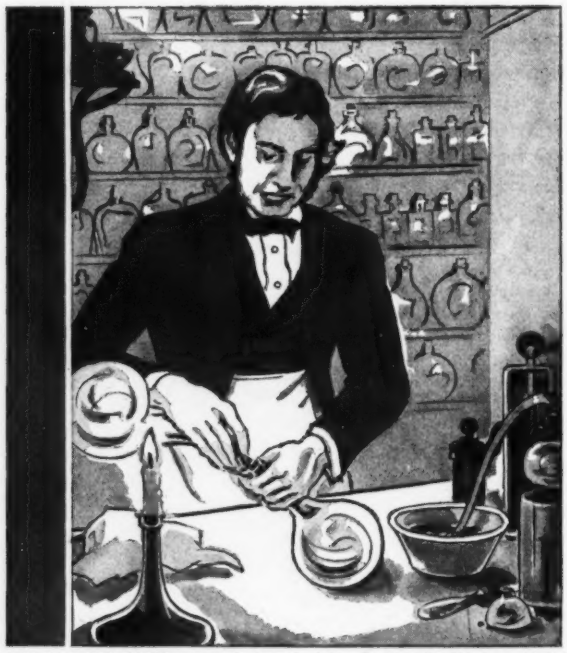
[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., November 9, 1931.—"Then and Now" is the title of a portfolio issued by the American Writing Paper Company in connection with what is regarded as one of the most complete advertising campaigns ever planned on Eagle-A Contract Bond. The portfolio contains many pages on which are compared by actual samples the old-fashioned and the modern letter heads. The campaign includes a series of sales letters which offer the portfolio to printers and engravers. Return postal cards enclosed with the letters are directed to the paper merchant in each territory. In case there is more than one merchant in the same territory, the printer or engraver may take his choice. The portfolio contains also four envelope enclosures which the printer can secure in sufficient quantities for sending out to those prospects on his own mailing list, and to further round out the campaign is an additional series of four enclosures, copies of advertisements which will appear in the country's leading advertising, printing, and trade magazines.

HIGH SPOTS IN CHEMICAL HISTORY

CHLORINE

No. 3 of a series of advertisements tracing the development and uses of modern chemicals



Michael Faraday in his laboratory at the Royal Institution, London, where the famous English scientist first liquefied chlorine gas

HOW to use most effectively the powerful oxidizing and germ-destroying properties of chlorine... how to make it most serviceable and safe for mankind ...has been the chief concern of progressive producers ever since chlorine first became an article of commerce.

Scheele, the Swedish pharmacist, discovered chlorine in 1774; Sir Humphrey Davy in 1810 proved that it was an element; but it remained for Michael Faraday shortly after to liquefy the greenish-yellow gas and thereby suggest modern methods of distribution.

First used commercially in the form of bleaching powder, chlorine played an important part in the development of English textile processes. Then came the discovery that the powerful sterilizing properties of chlorine could be conveniently and effectively used in the purification of water supplies. Since about 1910, when liquefied chlorine gas in cylinders was first offered in commercial quantities, the useful applications of chlorine have multiplied rapidly and many thousands of tons are now consumed each year in industry and in the field of sanitation.

Perhaps the most outstanding recent improvement in the development of chlorine is the introduction of Mathieson HTH—a stable concentrated hypochlorite containing 65% of available chlorine. This new chlorine-carrier has nearly twice the strength of the best grades of commercial bleaching powder and marks a far-reaching step in nearly a century of effort to improve the distribution of chlorine and make its application simpler, safer and more convenient.

. . .

HTH was made commercially available through the technical skill and resourcefulness of the Mathieson organization working to widen the usefulness of chlorine. Years of service, both to American industry and to sanitary authorities, have placed Mathieson in the forefront as a producer and shipper of liquid chlorine and chlorine products.

Great Structures Rest on Strong Foundations

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Section of the
Technical Association of the Pulp and Paper Industry
Edited by Ronald G. Macdonald, Secretary

Current Paper Trade Literature

Abstracts of Articles and Notes of Papermaking Inventions Compiled by the Committee on Abstracts and Bibliography of the Technical Association of the Pulp and Paper Industry

Clarence J. West, Chairman

For photostatic copies of articles appearing in the Abstract Section, address the chairman of the Abstracts Committee, Dr. Clarence J. West, National Research Council, 21st and B Streets, Washington, D. C. The charge for this service is: Photostats 9 x 11 inches, 18 cents each; 18 x 11 inches, 35 cents each; 22 x 18 inches, 70 cents each; minimum charge, 50 cents. Payment should be made upon receipt of invoice. Copies of United States patents may be obtained from the U. S. Patent Office, Washington, D. C., for 10 cents each. Send currency not stamps.

Sizing

New Sizing Process Using Electropositive Fibers. Kisou Kanamaru. J. Soc. Chem. Ind. (Japan) 33 (Supp. Binding), 123B-129B (April 1931).—The sizing process in which the sign of the charge of the cellulose is first reversed by the deposition of aluminum sulphate and the positive fibers thus prepared are then immersed in rosin size solution, has an advantage over the ordinary sizing process with regard to the amount of the rosin fixed and the effectiveness of the sizing. Even though this process is somewhat tedious from a practical standpoint, it may be used for the sizing of some special papers (such as electrical insulating papers, water proof papers, etc.) because many special properties of practical value, such as high electrical resistance, high resistance to water, etc., are obtained.—A.P.-C.

Paper-Sizing Process. Judson A. De Cew assignor to Process Engineers, Inc. U. S. pats. 1,799,216 and 1,799,217 (April 7, 1931).—*No. 1,799,216*—A stream of sizing solution is mixed with a stream of alum and the mixed materials are then mixed with a stream of stock. *No. 1,799,217* describes incorporating emulsified rubber particles into paper stock by mixing the rubber emulsion with the paper stock after the stock has been discharged from the beater and adding and mixing a coagulant such as aluminum sulphate to fix the rubber on the cellulose fibers then forming the latter into paper.—A.P.-C.

Paper Sizing Process. Julius Glatz. Fr. pat. 695,626 (May 15, 1930).—Paper is sized by adding, during or after its manufacture, the ammonium, sodium or other salt of the glycolic acid of cellulose soluble in water or homologous compounds, or a substance such as starch having an affinity for cellulose.—A.P.-C.

Drying

At What Temperature Should Paper Be Dried? Ogden Minton. Technical Association Papers XIV, 249-253 (May 1931); Pulp Paper Mag. Can. 31, 579-581, 596, 598; 604-606, 622 (May 7, 14, 1931); Paper Trade J. 93, No. 3, 42-46 (July 16, 1931).—There is an optimum drying temperature required to develop any given property of a sheet of paper, which temperature varies according to the property considered and the furnish used. The range of drying temperatures possible with an open dryer is small (about 170° to about 190° or 200°F), and the temperature cannot be maintained constant owing to variations on outside factors, while with an enclosed dryer, such as the Minton vacuum dryer, drying can be carried out at a constant temperature which may be adjusted at any desired value from 95°F. to considerably above 212°F. The effects of drying at various temperatures were investigated by means of a specially designed experimental dryer consisting of a stationary drying cylinder, 8 in. in diameter and 14 in. long, mounted horizontally on a heavy cast iron stand; a heavy cast iron bell-shaped cover, which can be placed over the cylinder and fits snugly against a rubber gasket, is hung from a chain so that it can be placed and removed quickly; the cylinder is fitted with a woolen drier felt which can be tightened or loosened from the outside; warm or hot water or steam up to 100 lbs. pressure can be introduced into the cylinder to obtain the desired drying temperature; a large vacuum connection permits of obtaining a vacuum up to 29.5 in. of mercury in 2 seconds. The large number of tests carried out so far have shown that: if a sheet of paper is once overdried it can never be brought back to a high strength test of any kind; the rate of drying does not affect the sheet, provided all other factors about the drying are kept in their correct proportions; other conditions being the same, a sheet that is allowed to cockle on drying is stronger than when it is not allowed to cockle, the gain in strength varying up to 12%. The Mullen test is considered to give a better measure of the properties of cockled paper than a tensile test, because the latter cannot put all the fibers under a uniform tension. Drying temperature (defined as that at which the water is evaporated from the sheet) affects one or more of the following properties of paper: Mullen strength, tensile strength, tear, fold, stretch, moisture content, color, ability to finish well and easily, size, cockle, actual finish as illustrated by M.G. drying, curling or flatness, tooth, shrinkage, the effect on any of these depending on the furnish. The following tendencies were also observed: highly-rosin-sized ledger paper is practically unsized when dried at 100° F., maximum sizing requiring a drying temperature of about 170°F.; color was generally (but not always) injured by high temperature; low-temperature drying increased folding resistance and

reduced shrinkage; very low temperature could be made to produce a tooth effect on the sheet, probably because the sheet had a tendency to dry fast to the cylinder and stick to it.—A.P.-C.

Insulating a Paper Machine by a New Method. Anon. Pulp Paper Mag. Can. 31, 609 (May 14, 1931).—By insulating the Minton vacuum driers at the Price Bros. mills with insulex (6 in. on top and 5 in. on the side) the temperature when starting up can be raised in one quarter of the time previously required, condensation at the top of the machine when steam was first passed through was entirely eliminated, and radiation from the machine was checked thus making working conditions more comfortable.—A.P.-C.

Paper Drying. Ed. von Asten. World's Paper Trade Rev. 95, 2254, 2256, 2297-2302 (June 26, 1931); Paper Mill 54, No. 30, 6, 8, 12, 22 (July 25, 1931).—After showing the mechanism of volatilization and of evaporation and their functions in drying paper, the part the drier felt play in the paper drying process in the open and vacuum types of driers and the requirements it should fulfill are discussed.

Packing Material for Soft Soap. Herman Fehrs, Lubeck, Germany. Nor. pat. 48,755 (Oct. 19, 1927).—A protective layer is arranged between two layers of paper, the protective layer is made of a mixture of equal parts of calcium oxide or calcium salt and paraffin, ceresin and similar substances.—J.F.O.

Process for the Manufacture of Containers from Paper Stock.. Erich Frost, Breslau. Ger. pat. 506,600 (May 2, 1929).—The container is soaked with a solution of bitumen and artificial rosin in a suitable solvent, and then heated so that the solvents are removed by evaporation. According to claim number 2, the solution containing the bitumen and artificial rosin also contains a drying oil such as wood oil and if necessary a drying medium.—J. F. O.

Process and Arrangement for the Manufacture of Discs of Board, Carton, and Similar Substances. Sachsische Cartonnagen-Maschinen-Akt. Ges. Dresden, Ger. pat. 509,101 (May 19, 1929).—A web of paper is pasted between two webs of carton and this band is led under the stamping presses by a device which is the patentable feature of the process.—J. F. O.

Process and Device for the Manufacture of Corrugations in Pliable Materials. Jacob Moll, Kreis Altenburg. Ger. pat. 506,599 (Nov. 5, 1929).—Compressed gases, especially compressed air is used to produce the corrugations, by having the pressure of the compressed gas exerted on the material being corrugated in the desired form. Other materials, such as, size, color and impregnating substances can be added with the compressed air. By heating or cooling the compressed air certain properties can be formed.—J. F. O.

Process for the Production of Asphalt Board or Asphalt Slabs from a Fiberous Mixture Drenched With Asphalt. Alex Wendler, Berlin. Ger. pat. 509,042 (June 13, 1926).—The hot asphalt mass is mixed with fiberous material, removed from the mixing container by means of a metal band or other suitable devices and further treated with fibers in the usual manner.—J. F. O.

Process for the Manufacture of a Fiberous Band by Drenching in a Continuous Manner Without Changing Containers, with Hot Benzol Solutions of Gutta Percha Like Asphalt Bituminous and Following with a De-Watering. G. Rothmund & Co., Hamburg. Ger. pat. 508,547 (Jan. 21, 1926).—The Fiberous belt is treated after with alcohol, acetone or similar materials—J. F. O.

Corrugated Board with Wire Reinforcement. Hugo Aurig G.m.b.h. Leipzig. Ger. pat. 503,311 (March 28, 1929).—The reinforcement consists of an even, wide meshed wire netting which is brought between the corrugated and the smooth layer of paper.—J. F. O.

Use of "Heralith" in the Pulp and Paper Industry. Belani. Kunstsoffe 21, no. 6, 124-125 (June, 1931).—Heralith is produced by converting paper wood into wood wool, treating with chemicals and pressing into slabs. The product has high insulating properties and is therefore well suited for insulating digesters, heat accumulators, floors, walls, etc., of pulp and paper mills.—C. J. W.

Stained Sheets of White Paper and Cardboard. Camillo Levi. Boll. Staz. Sper. Ind. Carta E Studio Fibre Tessili Vegetali 10, 41 (1931).—Irregularly placed yellow-brown stains of various sizes on white paper cardboard, from fir pulp containing 6 per cent mineral filler, sized with rosin and farina, were shown not to be due to starch clots, mineral concretions or iron compounds. Examination with the microscope after boiling with sodium hydroxide showed groups of cellulose fibers mixed more strongly than in the rest of the sheets.—C. J. W.

Stories of British Paper Making. New Northfleet Paper Mills. Anon. World's Paper Trade Rev. 95, 2244-2248, 2306, 2308 (June 26, 1931).—A. P.-C.

Windowless Mill. Anon. Paper Mill 54, No. 29, 4, 24 (July 18, 1931).—A brief description of the new 80-ton plan of the Blandin Paper Co., Grand Rapids, Minn.—A. P.-C.

New Steam Plant at Gatineau, Que. Anon. Paper Trade J. 92, No. 21 (May 21, 1931); Paper Industry 13, 376-378 (June, 1931).—A description of the recently completed plant, which houses four 1340-h.p., pulverized coal boilers.—A. P.-C.

Florida's Modern Paper Mill. John Corell. Paper Mill 54, No. 26, 2-3 (June 27, 1931).—A description of the plant of the Southern Kraft Corp. at Panama City.—A. P.-C.

United States Patents on Paper Making. First Quarter, 1931. Clarence J. West. Paper Trade J. 92, No. 22, 36-38 (May 28, 1931).—A list, in numerical sequence, of patents relating to pulp and paper making issued at Washington in Jan., Feb. and March, 1931.—A. P.-C.

Hydrogen Ion Methods in the Paper Industry. William R. Willets. Paper Trade J. 93, No. 1, 37-41 (July 2, 1931).—An address pointing out the chief applications of hydrogen-ion control in the pulp and paper industry and suggesting others. Bibliography of 94 references.—A. P.-C.

Helpful Suggestions for Better Handling of Paper Mill White Paper. Anon. Pulp Paper Mag. Can. 31, 817-818 (July 9, 1931).—A detailed description of the technique of the ortho-toluidine colorimetric method for the determination of residual chlorine in chlorinated water. It is based on the fact that when ortho-toluidine solution is added to water containing free chlorine, a yellow color is developed which is directly proportional to the amount of chlorine present.—A. P.-C.

Barge for Pulp Wood. George P. Fisher and Walter M. Balfour. U. S. pat. 1,801,548, April 21, 1931.—A hull having fore and aft decks has a cargo deck at a lower level than the fore and aft deck. The cargo deck slopes upwardly and inwardly towards the center of the vessel. Bulkheads above the cargo deck form compartments. A gate for each compartment is hinged to the side of the deck. Mechanically operated means hold and release the gates. Each gate is formed of horizontally spaced bars suitably braced together. The cargo is held on the deck by means of mechanically operated tying members, and it is discharged from the deck by the tightening of mechanically operated flexible members.—A. P.-C.

Stencil Paper. Daniel A. Williams assignor to A. B. Dick Co. U. S. pat. 1,795,461 (March 10, 1931).—Paper is coated with a composition comprising a cellulose ester such as nitrocellulose or cellulose acetate, glycerol (suitably in a quantity several times that of the cellulose ester), a relatively small proportion of a resin and a solvent which together form a soft stable product easily displaceable by impact of type.—A. P.-C.

Trade-Marking Carbon Paper. Samuel A. Neidich assignor to Neidich Process Co. U. S. pat. 1,796,956 (March 17, 1931).—Marking is effected by applying an acid material such as oleic acid capable of increasing the capacity of the web for absorption of waxy, oily transfer material, previous to application of the latter.—A. P.-C.

Some Chemical and Physical Observations on Hydration*

By Otto Kress[1] and Harold Bialkowsky[2]

Introduction

The nature of the changes in properties of cellulose fibers by the treatment in the papermaker's beater has been the subject of much investigation and discussion. This subject is as old as the art of papermaking itself. The fact that changes are produced when cellulose fibers are brought in intimate comminution with water, which give the fibers certain definite characteristics, is probably in itself the basis of paper manufacture. When fibers are treated in the hollander in the presence of water for a sufficiently long period of time, the stuff attains a slimy or greasy feel and it is difficult to squeeze the water out of a handful of this stock. The unbeaten stock does not have this greasy feel and water drains from it readily. Paper made from the unbeaten stock is low in strength, fluffy and soft, opaque and rather absorbent. With the proper beater treatment in water, the fibers can be made into paper which has good strength qualities, is hard and more or less water and oil resistant and also lower in opacity. Fibers which have been treated in water in such a manner that the resulting fiber-water mixture has a greasy feel and from which the water drains off slowly are said to be "hydrated," and the phenomenon producing this condition is called "hydration."

The effects produced by the hydration of fibers are well understood by the papermaker, but the actual mechanism of the changes that take place is not so clear. The term "hydration" was introduced into papermaking terminology as a name for the phenomenon that takes place when fibers are mechanically treated in water, since it was believed that the fibers combined with or took on water. The exact manner in which water is associated with the cellulose fiber during the beater treatment has been a matter of much speculation. In a strict chemical sense, water of hydration is combined in a compound in very definite molecular proportions. Thus, one molecule of anhydrous copper sulphate combines with five molecules of water to form hydrated copper sulphate. A new compound is formed having definite properties and characteristics. The stability of these hydrated compounds depends primarily on the temperature and the vapor pressures of the compound and the surrounding medium. At a given temperature, if the vapor pressure of the surrounding medium falls below that of the hydrated compound, the latter will decompose to reestablish an equilibrium. Hence the stability of hydrated compounds decreases with increasing temperature. Many chemical compounds can exist in several hydrated conditions, that is, various hydrates are possible, but for each hydrate there is a definite vapor pressure below which it is unstable. Hydrated compounds of cellulose have never been isolated in which the water is present in definite molecular proportions.

Hydration may also refer to a physical union of a material with water. In this case the term is synonomous with the terms "solvation" and "imbibition" or "adsorption." When dry gelatine is exposed to the atmosphere under ordinary conditions, it may take up 30 to 40 percent moisture on the weight of the dry sample. The amount of water taken up depends on the temperature and the relative humidity of the atmosphere. With hydration of this type, the free surface of a material becomes enveloped with a layer of water. Many crystalline and amorphous materials have a relatively small active surface, and consequently the amount of liquid imbibed or adsorbed is small. The amount of liquid taken up also depends on the nature of the liquid. A material may have a great affinity for a given liquid and only have a slight affinity for another. Colloidal materials have a great active surface, and therefore have a strong tendency to take up liquids. This particular group of colloidal materials is called "lyophilic," and when water is used as the imbibing liquid the materials are called "hydrophilic." This type of hydration is usually associated with an increase in volume or swelling of the material. Cellulose is a partially dehydrated lyophilic gel, and it may be readily swollen in water and in many aqueous solutions.

By the well known phenomenon of swelling, a liquid is taken up by a solid body, whereby the latter increases appreciably in size. Only in certain cases is the increase in dimensions the same in all directions. If the particles of which a body is composed are arranged in a haphazard manner, the swelling will probably be the same in all directions, but if particles are arranged in some orderly manner, the swelling will probably not be the same in all directions. Cellulose fibers belong to the latter class, the cellulose micelles are arranged in a more or less orderly manner in the fibers, and when the fibers swell they increase very little in length, but quite appreciably in width.

Swelling Action

J. R. Katz[3] considers swelling to be characterised as follows: "A solid, apparently homogeneous body takes on liquid, without losing its homogeneity; it becomes greater or swells; it decreases in cohesion that is, it attains a greater elasticity, it tears with a smaller force but with a greater stretch, it becomes soft and ductile rather than hard and brittle. These factors characterise a typical swelling.

"Swelling is in direct contrast to porous imbibition, as is shown by ordinary porous bodies. In this case the liquid is taken up in visible, performed cavities; the dimensions of the body do not increase; and its cohesion does not change. Swelling and porous imbibition can be readily distinguished from one another as long as above mentioned cavities are not too small (submicroscopic dimensions). If the dimensions of the cavities approach the order of magnitude of molecules, then the two concepts overlap."

When cellulose fibers take up water, there is probably a combination of true swelling and porous imbibition. The central canal or lumen of the fiber and the pits and pores of the cell wall are relatively large cavities and these may become filled with water of porous imbibition. The cell wall also takes up water and becomes thicker due to true water of swelling. The swelling action of cellulose fibers is made use of in preparing stock in the beater. When a "free" absorbent stock is desired, it is treated as quickly as possible with sharp tackle to obtain clear cutting action before too much swelling takes place and while the fibers are still rather brittle. When a "slow" greasy stock is desired, the fibers are treated rather slowly with dull tackle to avoid cutting in the early stages and to allow the fibers to swell and become plastic and ductile before they are bruised.

The structure of fibers is an important factor in the process of hydration and swelling. The structure of fibers has been predicted from optical phenomena manifested by the fibers, but only within recent years has the actual dissection of the fibers

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[1] Member TAPPI, technical director, Institute of Paper Chemistry, Appleton, Wis.

[2] Associate Member TAPPI, Western Papermakers Chemical Corporation research fellow, Institute of Paper Chemistry, Appleton, Wis.

been accomplished. Ritter[4] has succeeded in separating the cell wall of fibers under the microscope into several distinct layers with the aid of various reagents, the layers have been separated into fibrils, and the fibrils have been broken down into still smaller units which he calls "fusiform bodies." The layers composing the cell wall are structurally different, and they are arranged in such a manner as to give the fibers great strength. The layers are composed of thread like bodies called fibrils. In the outer layer of wood fibers the fibrils are wound about the inner layers at approximately right angles to the fiber length, similar to a layer on a spool of thread. The inner layers are wound with a much greater pitch, from zero to thirty degrees with the axis of the fiber. The inner layers therefore maintain the strength in the longitudinal direction, while the outer layer holds the inner ones intact. When the outer layer is bruised or broken, the inner layers are allowed to spread and fibrillate. Cotton and other cellulose fibers have a similar structure, but in the case of the bast fibers the windings of the outer have a greater pitch, which would tend to make them more susceptible to fibrillation during beating.

Previous Work

Many of the earlier investigators of the hydration of cellulose during beating believed that a chemical change of the cellulose material occurred. This idea is supported by the observation of changes in the chemical constants of the material. Thus, Schwalbe[5] found that gelatinized or hydrated cellulose shows a greater hydrolysis difference than the untreated cellulose material, but to obtain definite results it is necessary that there be a wide difference in the degree of hydration. Gelatinization also increases the adsorption of copper from cold Fehling's solution, to give a high cellulose number.[6] The increase in cellulose number is probably due more to the swelling of the incrustants than to the cellulose itself.[7] The determination of the hydrate copper number is satisfactory for pure cellulose but not for determining the degree of gelatinization of ground wood or raw wood pulps, since the incrustants have a reducing action on Fehling's solution.[8] According to Seibert and Minor,[9] the cellulose number of beaten wood pulps is no larger than the experimental error in the determination. Schwalbe also found that the alkali solubility of the beaten material is greater than the original, and that there is a slight increase in copper number.[10] Hydration of the cellulose by beating is accompanied and assisted by the formation of hydrocellulose and oxycellulose.[11] The tendency of wood pulps to hydrate is perceptively decreased by long boiling with water or by steaming, but is increased by a preliminary treatment with acids or with oxidizing agents. Many materials increase the rate of hydration; such materials as dextrins, sugars and degraded cellulose are particularly well suited. One to five percent sodium carbonate, based on the weight of the dry pulp has been recommended as a beating accelerator and to obtain increased bursting strength.[12]

According to Nakano,[13] when pulp is beaten, its copper number gradually increases with the beating time but this phenomenon is merely coincidental. There is no evidence to show a relationship between copper number of the unbeaten pulp and the wetness of the beaten stuff, nor between the copper number of the beaten stuff and the wetness of the stuff. Nakano has also made a study of the effect of various reagents on beating.[14] Under certain conditions, an acid treatment accelerates the beating process tremendously and produces transparent and parchmentized paper, but the product is very weak and apt to produce a large loss through the screen. Beating in 95 percent alcohol decreases wetness and beating in dilute aqueous glycerol retards the beating degree a great deal . Beating in alkaline solutions produces a slimy stuff, but if a strong pulp is previously treated in weak alkali and washed, the beating can not be accelerated. Bleaching of kraft pulp will make the beating faster, although there is a considerable difference in the beating degree between different pulps and degrees of bleaching. A pre-treatment in lactic acid or beating in the acid will not hasten the beating degree. Weak acid treatment produces no effect on the wetness, while a weak alkali retards it to a considerable degree. If pulp is heated in air, its beating degree is slightly retarded. Disintegrated glassine when beaten again and made into paper, loses its transparency. This shows that heating and drying must produce an irreversible change in the colloidal state of fiber.

Nakano has also found that the cuprammonium viscosity of fibers is greatly decreased by beating, due probably to the mechanical action of the beating in decreasing the size of the micellae of the fibers.[15]

The hydration of cellulose by beating, according to Briggs,[16] is not a purely mechanical phenomenon, but a physico chemical one. A cellulose hydrogel is formed through molecular surface distention, water being adsorbed and becoming what is now termed colloidal water. That water plays an essential part is shown by the failure of cellulose to gelatinize on beating in alcohol or petroleum.

Gesell and Minor[17] consider hydration to be a process of bringing the electrostatic affinities of the colloidal cellulose molecule into action, by means of which the hydroxyl and hydrogen ions of water are adsorbed causing the fibers to swell into a loose gel, thus giving the stock its characteristic slowness. The cutting of the fibers, while no doubt interfering with the beating out of those tendril like filaments which are seen in parchment paper, causes a rapid subsequent hydration.

Pulps which have been beaten take on more hygroscopic water than the original material. This fact has been made use of in a method for determining the degree of hydration of pulps.[18] The degree to which pulp has been hydrated by beating may also be judged by a determination of its adsorptive capacity for sodium adsorptive hydroxide in alcoholic solution,[19] and for dyes such as diamine blue and methylene blue.

By means of the quartz spiral balance, Campbell and Pidgeon[20] have determined vapor pressure-moisture content curves of pulps at various stages of beating. They find that the curves for the beaten pulps coincide with those of the unbeaten material, and conclude that beating does not alter the hydration of the pulp. They explain the properties of the beaten pulp on the theory that beating is simply a mechanical action, whereby the external surface of the fibers is greatly increased so that the crystallizing of the cellulose may more effectively be exerted in binding fibre to fibre in the sheet.

Strachan has made a comprehensive study on the nature of hydration of cellulose in papermaking, and compares the behavior of cellulose fibers in water with that of cubes of vulcanized cotton fiber.[21] Cellulose in the form of fibers as used in papermaking exhibits all the properties associated with an elastic gel. Cellulose differs from other elastic gels in being porous and holding considerable quantities of adsorbed air and gases. Hydration of the fibers in papermaking consists in an increased degree of imbibition due to increase of specific external surface of the cellulose masses (fibers). The latter is produced by slight or extensive fibrillation of the fibers, whereby a portion of the latter increases in specific external surface up to one hundred times that of the normal fiber. Hydration during beating is thus purely a physical action.

Curran, Simmonds and Shang have investigated the effect of beating on the chemical properties of pulps, and found that the chemical constitution of a stuff beaten 4 to 6 hours in an approximate neutral aqueous suspension is the same as that of the unbeaten pulp.[22]

Nature of the Problem

Probably the general opinion at the present time is to consider the hydration of pulp during beating, primarily as a physical phenomenon, which may influence to a certain extent the chemical properties of the pulp. The object of the present work is to study the physical and chemical effects produced by the beating of pulp, and to attempt to discover the function of water in the beating process. Is water the only pure liquid in which cellulose fibers

can be treated to obtain definite and desirable papermaking qualities, and what inherent physical or chemical property of water makes it suitable for this purpose, (other than its abundance in nature)?

The present investigation includes a study of the effect of beating on the chemical constants of the pulp, such as the alpha cellulose content, copper number, etc., and the change in adsorption power of the cellulose fibers toward chemicals commonly used in the beater, such as alum, starch and dyestuffs. Also a study of the physical properties of cellulose fibers when beaten in water and in various pure liquids, and the relation between the swelling power of these liquids toward the cellulose fibers and the behavior on beating.

In selecting a pulp for the following investigations, an unbleached Mitscherlich sulphite pulp was chosen, since this type of pulp can be readily hydrated and it is particularly suitable for the manufacture of highly hydrated papers, such as glassine. The particular sample was taken from a commercial run on spruce, cooked for twenty hours at a maximum temperature of 120 deg. C. The cooking liquor analyzed 5.92 total, 4.51 free, and 1.41 percent combined sulfur dioxide. The pulp was obtained in the form of wet laps, approximately thirty-five percent bone dry.

The Effect of Beating on the Chemical Properties of the Pulp

A series of samples was prepared by beating some of the pulp in a one pound Valley Iron Works experimental beater, using distilled water. The beater was of a movable bed plate type. The stock was beaten at a consistency of about two and one-half percent for four hours with a rather hard setting of the bed plate, and samples were taken at eighty-minute intervals. All subsequent beater runs were made at the same consistency and with identical roll setting. The water was removed from the samples and the filtrates were analyzed for solid materials. The samples were then allowed to air dry and the following chemical constants were determined; duplicate check determinations of copper number, alpha cellulose content, one percent sodium hydroxide solubility, Schwalbe hydrolysis number, and the viscosity in cuprammonium solution were made. The alpha cellulose content was determined by the proposed standard method (method IV) of the American Chemical Society (a), the copper number by the Schwalbe-Braidy method (b), and the solubility in one percent sodium hydroxide solution by the method given in Schorger (c). The Schwalbe hydrolysis number was determined by the method given in Schwalbe and Sieber (d), and the viscosity in cuprammonium solution was determined by the method described by Bialkowsky (e). The freeness of the pulp was determined with the Schopper-Riegler apparatus at each stage of the beating. The progress of the beating was observed by noting the condition of the fibers under the microscope, and photomicrographs were prepared of samples at each stage of the beating. The values of the chemical constants at the various stages of beating are given in Table I, and are shown graphically in Fig. 1.

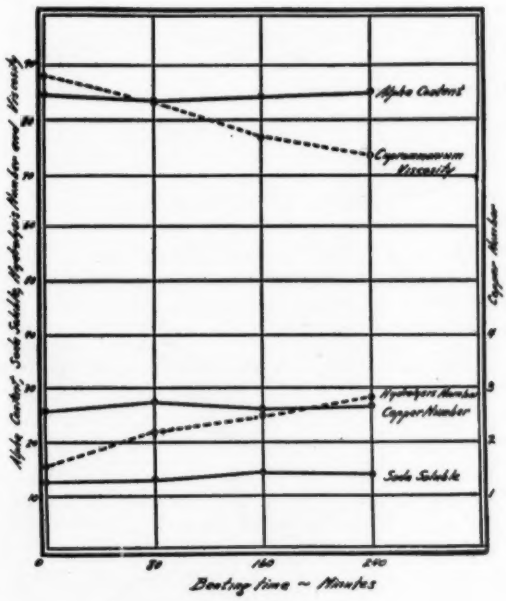


FIG. 1

The effect of beating on the chemical constants of an unbleached mitscherlich sulphite pulp.

TABLE I
CHEMICAL TESTS ON PULP AT VARIOUS STAGES OF BEATING

Sample	Alpha cellulose	Copper number	Soda Soluble	Hydrolysis number	Cuprammonium viscosity	Freeness
Unbeaten	84.62	2.58	12.60	15.3	88	840
Beaten 80 min.	83.78	2.75	13.10	21.8	83	370
Beaten 160 min.	84.05	2.60	14.35	24.8	77	170
Beaten 240 min.	84.88	2.66	13.80	28.0	74	80

The alpha cellulose content, copper number, and soda solubility are practically constant throughout the entire beating. The hydrolysis number increases as the beating progresses, which is probably due to an increase in surface activity, which renders the cellulose more susceptible toward violent hydrolysis action. The viscosity in cuprammonium solution decreases as the beating progresses, probably due to a mechanical degradation of the cellulose micelle. The beating was continued to produce a stock so slow and short that it would not have been suitable for paper machine operation, as shown by the Schopper-Riegler freeness values. The photomicrographs show that the stock was well hydrated and fibrillated. These figures agree with other work on this phase of the subject, and they show that little or no change occurs in the chemical nature of the pulp during beating. The minor changes that do occur do not explain the great physical change in the nature of the cellulose fiber produced by beating.

When stock, which has been highly beaten, is allowed to air dry, it shrinks to a dense horny mass. This material takes much longer to soak and become soft in water, than the unbeaten material. Due to the dense condition of stock after beating it may be more resistant to the action of chemicals during the periods of time allowed in the determination of the chemical constants, and an attempt was made to determine the chemical constants of the material in the wet condition, before it had dried to a hard horny mass. The wet material was about thirty percent air dry, and it was difficult to regulate the concentration of the chemicals for the determination of the chemical constants. However the results agreed quite closely with the results obtained on the fibers in the air dry condition, and it can be stated that the physical condition of the beaten material, did not alter the result of the chemical determinations to any appreciable extent.

The water in the beater was analyzed for total solids, ash, and combustible matter, at the various stages of beating. These results are given in Table II. The values are given as the number of grams of material dissolved from one hundred grams of air dry fiber in the beater.

TABLE II
DISSOLVED SOLIDS IN THE BEATER WATER AT VARIOUS STAGES OF BEATING

Sample	Grams of material dissolved from 100 grams air dry cellulose fiber		
	Total solids	Ash	Combustible matter
Start of beating	.249	.065	.184
Beating 80 minutes	.565	.140	.425
Beating 160 minutes	.723	.122	.601
Beating 240 minutes	.880	.137	.743

(a) Ind. and Eng. Chem., Analytical Edition, Vol. I, No. 1, Jan. (1929).
(b) J. H. Burgen and J. E. Minor, Tech. Assn. Papers, p. 272, May (1930).
(c) Chemistry of Cellulose and Wood, page 506.
(d) Die Chemische Betriebs-Kontrolle in der Zellstoff und Papier Industrie, 2nd Ed., page 243 (1922).
(e) H. W. Bialkowsky, Technical Assn. Papers, page 195, May (1930).

As the beating progresses, the water in the beater continues to dissolve material from the pulp, but these amounts are extremely small. The water extracts showed no reducing action toward Fehlings' solution, either before or after boiling with dilute acid.

Change in Adsorption Capacity with Beating

It has been noted that beating increases the surface activity of the cellulose fibers, and methods have been proposed to determine the degree of hydration by observing changes in adsorptive capacity. The cellulose number determination, proposed by Schwalbe depends on the adsorption of copper sulfate from Fehlings solution. Much confusion exists in the literature on the adsorptive capacity of cellulose fibers. Recent work seems to show that the adsorption is due to an extremely small quantity of mineral matter in the pulp. An attempt was made to determine any change in the adsorptive capacity of the cellulose fibers for materials commonly used in the beater, as the beating progresses.

Adsorption of Alum

Samples of beaten and unbeaten pulp were agitated in dilute alum solutions under identical conditions of time and concentration. The pulp samples were taken from the beater and not allowed to air dry, so that the beaten material retained its gel like structure. The concentration of the cellulose fiber and of the alum were the same in both cases, and a blank solution containing alum only, of the same concentration, was used as a control. After a definite period of agitation, samples of the liquids were withdrawn and the alumina and sulfate content were determined. Ten grams of pulp were used in each case in 500 cc. of solution, containing two percent alum based on the air dry pulp. The results of these determinations are as follows:

	Figure based on air dry pulp	
	Per cent alumina adsorbed	Per cent sulphate ion adsorbed
Unbeaten pulp	0.15	0
Highly beaten pulp	0.30	0

There seems to be a preferential adsorption of the alumina by the pulp. Apparently no adsorption of the sulfate ion occurred. The beaten material adsorbed twice as much alumina as the unbeaten stock, but the quantities are quite small in both cases.

Absorption of Starch

The effect of beating on the adsorption of a collodial material such as starch was also investigated. Pulp was beaten in the presence of six percent beater starch, based on the air dry pulp. Hand sheets were prepared at various stages of the beating and these sheets were then analyzed for starch content. The first sheet was made after the stock and the starch had been circulating for ten minutes, and its starch content was formed to be 0.35 percent. Sheets made from stock that had been beaten for ninety minutes showed a starch content of 0.42 percent. The beaten material seems to retain a little more starch, but the difference is very slight and within experimental error. The amount of starch retained is very small in both cases, less than 10 percent of the total starch used. Beating does not seem to improve the starch retention in the beater to any appreciable extent.

The Effect of Beating on the Absorption of Dyestuffs

It is a well known fact that when colored stock is beaten, the depth of colors measured by the dry sheet develops as the beating progresses. If the proper amount of dyestuff is added to a beater that has just been furnished, a handsheet can be prepared, which will have a comparatively light shade. If sheets are made as the beating continues, the color of the sheets will gradually become more intense, and if the stock is beaten until it becomes well hydrated, a sheet with a very intense shade may be produced. A wide range of shades can therefore be produced with the same amount of dyestuff by changing the beating conditions. Since the same amount of dye has been added in each case, the fibers either adsorb more dye stuff from the water in the beater, or some physical property of the beaten material is developed, which tends to intensify the shade.

In general, gelatinized or swollen cellulose shows an increased dye adsorption. Mercerized cotton will develop a more intense shade, than a similar unmercerized cotton, when treated with the same amount of dyestuff. According to Heuser, the degree of dyeing of the mercerized as compared with the unmercerized fabric, with the same adsorption of dyestuff, may be easily due to the different refractivity of the two kinds of cellulose. The fibres of the mercerized fabric have a marked luster even in the uncolored condition.

The different degrees of adsorption of dyestuffs (direct cotton dyes) by mercerized and unmercerized cellulose and also by cellulose of different degrees of mercerization has been used by Knecht as a basis for the determination of the degree of mercerization of cellulose. The greater this degree of mercerization, that is, the more its physical properties have been changed, the more dyestuff will it adsorb. An exception to this increased adsorption of dyes by mercerized cotton is found with the basic dyes.

Samples of unbeaten and beaten pulp were dyed under similar conditions with Du Pont Methylene Blue. The quantity of fiber the amount of water and the time and manner of treatment were the same in each case. The amount of dyestuff used was one pound of dye to one thousand pounds of air dry fiber in each case. Sheets were formed and the back waters were collected in a receptacle just below the wire of the hand sheet mold. The back waters were then compared colorimetrically and the intensity of the blue color was practically the same for the beaten and unbeaten stock. The back water from the beaten stock was probably a trace lighter than that of the unbeaten material, showing that the amount of color adsorbed by the fibers was practically the same in each case, with a very slightly greater adsorption for the beaten stock. The shade of the sheet made from the beaten material was much darker than that made from the unbeaten material. The tremendous difference in shades could certainly not be due to the very slight difference in absorption. Portions of the sheets were then finely disintegrated and the shades of the ground materials were then compared with each other and with the shades of the sheets. The shade of the colored unbeaten stock in the finely divided condition was practically the same as the shade of the sheet of unbeaten material, but in the case of the beaten stock, the shade in the finely divided condition is much lighter than its corresponding sheet, in fact the shades of the beaten and unbeaten stock in the finely divided condition were nearly the same. If the stocks could be ground to the same degree of fineness, an excellent match in shade seems very probable. The greater intensity in shade of the sheet from the beaten matrial seems to be due to the physical condition of the sheet, its dense or compact character.

The above experiment was repeated using two and five times the amount of dyestuff and similar results were obtained. Acid and direct cotton dyes, Du Pont Acid Croceine Scarlet Conc. and Pontamine Sky Blue 5 B conc. respectively, were then used and similar results were obtained. The dyed sheets made from the strongly beaten stock were very much deeper in shade than similar dyeings made on unbeaten pulp. Samples of the beaten and unbeaten dyed sheets, after grinding, showed the same color intensity, so that the difference in shade of the dyed sheets is occasioned by their physical condition and not to any variation in dye adsorption.

The Effect of Beating on the Physical Properties of the Resulting Papers

The main object of beating is to treat the fibers in a suitable mechanical manner to develop certain characteristics of the fibers, which determine the character of the resulting sheet. The paper maker has learned from experience the degree of beater treatment, that is necessary in order to produce paper having the de-

sired properties. He has found that different pulps behave differently in the beater, and different beaters have a varied action on the same pulp. Each paper machine has its idiosyncrasies and the stock must be prepared to suit these conditions.

The treatment of pulp in the beater is determined by the properties which the resulting sheet must possess. In order to develop certain strength properties of the resulting sheet, a definite beating or refining treatment is necessary. Absorbency, softness, grease resistance, opacity and other characteristics of the resulting paper require suitable pulps and proper beater treatment. The degree of hydration of the fibers is the most important factor in attaining the necessary properties of the resulting paper. Water plays a predominant role in the manufacture of all types of papers, not only because of its cheapness and abundance, but also on account of certain inherent properties of water itself.

Beating in Water

The changes in physical properties of the finished paper with increase in time of beating are all well known, but they are given here for comparison with the properties developed on beating in other pure liquids. To avoid the effects of small traces of water in the pulp, when it was beaten in liquids other than water, the pulp was thoroughly bone dried at 105 deg. C. To obtain a good comparison, the pulp was also bone dried before it was treated in water.

The bone dry stock was furnished into the beater using water, and the beating was continued for four hours. Hand sheets were made at definite intervals, under standard conditions of pressing, drying, etc. The handsheets were then subjected to various physical tests, such as bursting strength, fold, weight, oil penetration, ink penetration, and size resistance with the Valley size tester. Photomicrographs were prepared of the fibers at each stage of the beating to record the condition of the fiber. The freeness of the stock in the beater was also determined at each stage by means of the Schopper Riegler Apparatus.

The bursting strength increased with the time of beating in the usual way. The folding resistance dropped with increase in time of beating, due to the cutting of the fibers. The oil resistance increased as the beating progressed, as did the size resistance. The freeness decreased as the beating progressed and in the latter stages of beating the stock was extremely slow. The actual figures are given in Table III. The photomicrographs showed that the beaten fibers were well fibrillated and hydrated. Fig. (a) shows the fibers in the unbeaten condition, Fig. (b) illustrates the conditions of the stock after four hours beating, and Fig. (c) shows the effect of beating for eight hours. The fibers have been subjected to some cutting action, but the fibrillation is very predominant. After eight hours beating the bulk of the stock is in the fibrill condition, but portions of the fibers are still somewhat intact.

FIG. (b) BEATEN 4 HOURS IN WATER.

Unbleached mitscherlich sulphite pulp.

Beating in Fuel Oil

The fuel oil was a mixture of hydrocarbons, slightly heavier than kerosene. Traces of water were removed by treating the oil

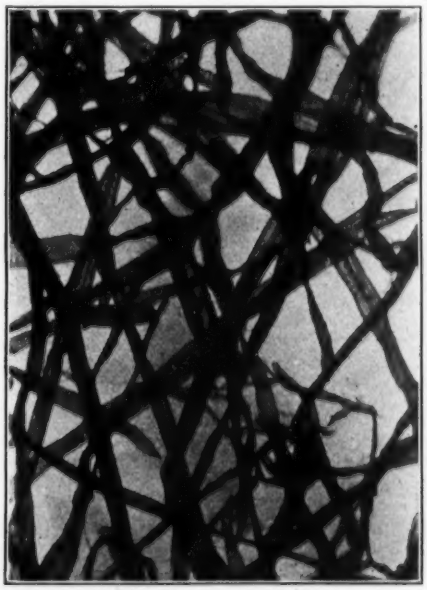


FIG. (a) UNBEATEN.

Unbleached mitscherlich spruce sulphite pulp.

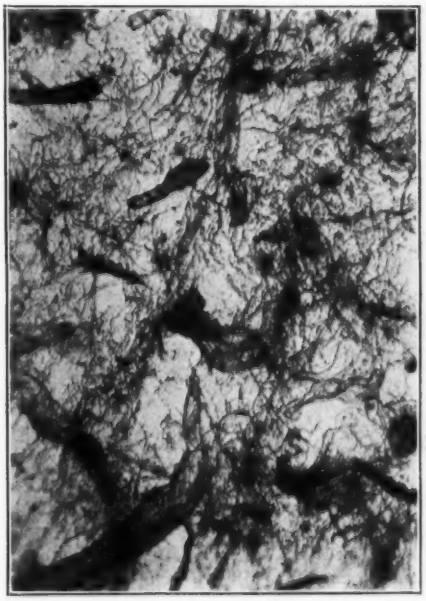


FIG. (c) BEATEN 8 HOURS IN WATER.

Unbleached mitscherlich spruce sulphite pulp.

TABLE III.—PHYSICAL TESTS ON HAND SHEETS PREPARED FROM PULP BEATEN IN VARIOUS PURE LIQUIDS

Marks	Ream wt. (24x36–480)	Mullen×100 / Ream wt. (24x36–480)	Folding endurance	Oil penetration	Valley size tester	Freeness	Ink flotation
Water unbeaten	51 lbs.	85%	2973	0	1 sec.	840	0
Water beaten 80 minutes	49	101	1309	4 min.	30 sec.	360	4.5 min.
Water beaten 160 minutes	47.5	109	895	21 min.	35 sec.	170	7.0 min.
Water beaten 240 minutes	52	135	37	120 min.	45 sec.	90	12.0 min.
Butyl alcohol unbeaten	52	13.5	2	0	0	875	0
Butyl alcohol beaten 80 minutes	49	10	0	0	0	850	0
Butyl alcohol beaten 160 minutes	51	8	0	0	0	825	0
Butyl alcohol beaten 240 minutes	48	8.3	0	0	0	800	0
Fuel oil beaten 8 hours	71	0	0	0	0	825	0
Furfural beaten 3 hours	58	9	0	0	0	800	0
Amyl alcohol beaten 3 hours	52	0	0	0	0	850	0
Amyl chlorides beaten 4 hours	75	0	0	0	0	800	0

with calcium chloride for over fourteen days prior to use. The beater was furnished as in the case of water, but some difficulty was experienced in starting the circulation, and the stock broke up with extreme difficulty. After the stock had been broken down it circulated readily. Samples were taken at various intervals, washed with suitable organic solvents and finally with water, and sheets were prepared. The beating was continued for eight hours, but the stock still remained very fluffy and free.

The sheets made from this material developed no strength, had no water or grease resistance, and were adsorbent. Photomicrographs showed that the fibers were subjected to sharp cutting action, with no fibrillation (Fig. d). After beating eight hours the fibers were cut to very small particles, but the cutting action was very sharp and well defined. For comparison with the water beaten values, the freeness was determined in a water suspension, and the freeness was found to be constant even after eight hours beating, when the fibers had been cut to an extremely short condition. The actual values of the physical tests are given in Table III. Beating in fuel oil produces entirely different results from those obtained by beating in water.

Beating in Butyl Alcohol

Some bone dry stock was then beaten in n-butyl alcohol ($CH_3 . CH_2 . CH_2 . CH_2OH$) in the experimental beater. At the start some difficulty was experienced in maintaining the circulation of the stock, due to the difficulty in reducing the stock to the fibrous condition. After the stock had been broken down the circulation proceeded as in the case of water. The beating was continued for four hours, and samples were taken at 80-minute intervals. The alcohol was removed by washing with water and sheets were prepared. After four hours beating the stock was still very fluffy and free. Hand sheets prepared from this stock had very little strength and had no grease or size resistance. The freeness values were determined at various intervals, and it was found that the freeness had changed very little, the initial freeness was 875 and after four hours beating it had dropped to 800. Photomicrographs of the fibers at various stages of beating revealed a sharp cutting action, with no fibrillation of the fibers. Fig. (e) shows the condition of the fiber after four hours beater treatment in butanol.

Beating in n-butyl alcohol produces results very similar to beating in fuel oil, the resulting stock was very fluffy and free, and had very little strength. The results of the physical tests are given in Table III.

Beating in Amyl Alcohol, Amyl Chlorides and Furfural

Beating experiments were then carried out using amyl alcohol, amyl chloride and furfural. These experiments were made in the laboratory beater, maintaining the same conditions of stock concentration and roll setting as in the previous experiments. The pulp was bone dry when furnished and in each case difficulty was experienced in breaking down the stock, but after the stock was reduced, the circulation was normal. The behavior of all these liquids in the beater was the same as fuel oil and butyl alcohol. In each case, the stock remained free and fluffy, even after four hours' beating. The strength of hand sheets made from these stocks was very low. The sheets were adsorbent and had no grease or size resistance. The fibers showed no fibrillation, but

FIG. (d) BEATEN 8 HOURS IN FUEL OIL

Unbleached mitscherlich spruce sulphite pulp.

FIG. (e) BEATEN 2½ HOURS IN BUTYL ALCOHOL.

Unbleached mitscherlich spruce sulphite pulp.

were subjected to sharp cutting action. In some cases the fibers were cut to a length slightly greater than their width. In each case, the freeness of the beaten stock was practically the same as the freeness of the original material, even though the fibers had been cut to an extremely short length. The length or size of the fibers does not seem to affect the Schopper-Riegler freeness values, when the stock is not swollen. The results of the physical tests on the handsheets prepared from these stocks, are recorded in Table III.

These experiments show the predominant effect of water in the beating process. Beating in water produces certain properties in the pulp, which can not be produced by beating in fuel oil, furfural and the higher alcohols. The stock does not become "slow" when it is prepared in these organic liquids and paper made from this stock has comparatively little strength.

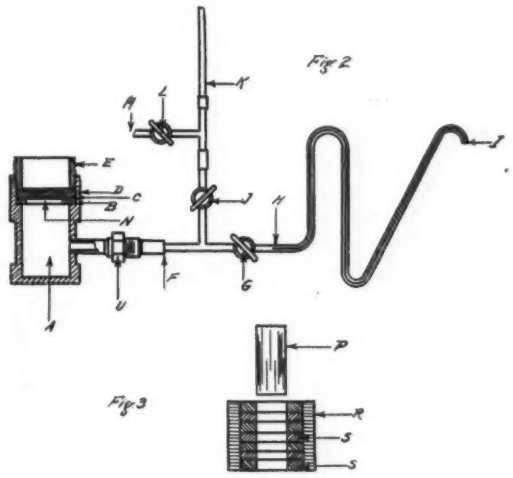
It was previously mentioned that cellulose fibers in the presence of water, swell and take up water of imbibition. According to J. R. Katz, swelling is associated with a decrease in hardness and strength of the material, and an increase in elasticity and plasticity of the material. When cellulose fibers are beaten in water, the stock becomes slow and the fibers are cut to a certain extent, but the cutting action is associated with fibrillation of the fibers. But when cellulose fibers are beaten in the other liquid mediums mentioned above, the stock does not become slow and the fibers are cut without producing fibrillation. If swelling of the fibers is responsible for the hydration effect produced by beating in water, very little or no swelling must take place when the fibers are treated in fuel oil, and the other liquids described above, since entirely different results are obtained when these liquids are used. It seemed advisable, therefore, to make a study of the comparative swelling power of various liquids toward cellulose fibers.

The Swelling Power of Cellulose Fibers

The results of the previously described experiments seem to indicate that hydration is closely associated with the phenomenon of swelling. If on swelling, the fibers become soft and plastic, it is reasonable to assume that the beating action would crush and fibrillate the fibers. If the fibers are stiff and rather brittle, the beating action would result in sharp cutting.

The swelling power of such colloidal materials as raw rubber and gelatine in various liquids has been quantitatively determined. Strachan determined the rate of imbibition of water in vulcanized fiber, and considers the behavior of paper making fibers in water to be similar to that of the vulcanized fiber blocks. Posnjak[n] designed an apparatus and with this arrangement determined the swelling pressure of raw rubber in many organic liquids and of gelatine in water. An apparatus similar to that used by Posnjak was designed through the aid of Dr. B. W. Rowland of the Institute of Paper Chemistry, which measures change in volume rather than the swelling pressure.

A sketch of the apparatus known as the dilatometer, used for determining the degree of swelling, is given in Fig. 2. The dilatometer vessel is made of a steel tube 2 inches in diameter and about 3 inches long. A side tube contains a union U. An annular ring B, the hole of which contains the compressed pulp N, rests on an annular seat of the vessel A. Above the ring containing the pulp is a porous plate C, which in turn is covered with a steel plate, containing many holes about 1/10 inch in diameter. The ring, porous plate and the punched disc are firmly held against the seat of the dilatometer vessel by the threaded hollow, cap E. The glass tubing is cemented to the steel side tube, by means of litharge and glycerine cement. The apparatus is provided with ground glass stopcocks L, J, and G. A capillary delivery tube is fused to the apparatus at H. The system is connected to a mercury reservoir at M. The vertical glass tube K is used to develop hydrostatic pressure in the system when this is desired. The entire system is filled with mercury, and the swelling liquid is poured in E, above the plate D. The liquid passing through the punched steel plate and the porous plate, is imbibed by and swells



FIGS. 2 AND 3

the cellulose fibers at N. The pulp expands against the mercury in contact with it, and forces mercury out of the system at I. This mercury is collected in a beaker supported on a balance pan, and is weighed directly.

Cellulose fibers are compressed in the cavity of the steel ring B in the following manner, as shown in Fig. 3, which shows the arrangement in cross section. A stack of steel rings S is held in alignment by means of a surrounding short cylinder R. The plunger P just fits the bore of the ring stack. The sample of shredded pulp is placed in the cavity of the ring stack, the whole placed in a hydraulic press, where the pulp is compressed into the bore in the lower ring. The lower ring containing the highly compressed pulp is then removed and placed in the dilatometer. The rings had an internal bore of one inch diameter and were three-sixteenths of an inch thick. Using three grams sample of pulp and a pressure of 10,000 lbs. per square inch, the bore of the washer was completely filled with compressed pulp. The density of the fibers in this condition was very close to one.

The procedure for the following experiments was as follows: The pulp used was from the same stock used in the beating experiments and was used in the air dry condition. The ring and the plate were removed from the dilatometer and the level of the mercury in vessel A was adjusted to just above the annular shoulder. The ring containing the pulp was then placed on this mercury surface. The plates were put in position, and the open cap E was screwed in tightly. With the stopcock J closed, and stopcock G in the open position, the cap is screwed in slightly to bring the mercury just to the end of the capillary I. The tip of the capillary is about 3 inches above the level of the mercury in the dilatometer vessel, so that the pulp swells under a slight pressure. The swelling liquid is then poured into the cap E. The mercury displaced through I in a given period of time is collected in a beaker on a balance pan just below I, and weighed. All of the following determinations were carried on in duplicate determinations in exactly the same manner. The experiments were carried out at room temperature (25°). Since the swelling is quite appreciable, the effect of the expansion of the mercury due to a few degrees temperature change, causes little error in the results. The determinations could be checked within ten percent and in most cases within five percent.

The rates of swelling and the maximum change in volume of the pulp with various pure liquids were determined. The curves showing the rates of swelling are given in Fig. 4. The swelling is given as the percent increase in volume and these values are plotted against time in hours. The comparative swelling powers of the various liquids are given in Table IV, these values are given as the maximum percent increase in volume of the pulp.

TABLE IV
COMPARATIVE SWELLING POWER OF CELLULOSE IN VARIOUS LIQUIDS AND SOLUTIONS

Liquid	Per cent increase in volume
Formamide	125
Water	90
.1 per cent aqueous alum solution	89
N/10 aqueous NaOH solution	89
Dilute aqueous rosin size	91
Dilute black liquor (Kraft)	88
Ethylene glycol	89
Methyl alcohol	62
Ethyl alcohol	40
n-Propyl alcohol	6
n-Butyl alcohol	4
n-Amyl alcohol	4
Furfural	8
Furfuryl alcohol	51
Fuel oil	2
Aniline	15
Nitro benzol	17

The rate of swelling is very rapid, in most cases the maximum swelling is obtained in a few hours. The swelling power of water is very high, when swollen in water the volume of the pulp increases ninety percent. In contrast to water, the swelling power of fuel oil is extremely low, the increase in volume of the pulp was but 2 percent. Formamide ($HCONH_2$) has an extremely high swelling power, the maximum percent volume increase was 125 percent. The swelling power of ethylene glycol was practically the same as the swelling power of water. The volume increased 89 percent.

The swelling power of the alcohols decreases as the length of the hydrocarbon chain increases. The increase in pulp volume using methyl alcohol was 62 percent, that of ethyl alcohol was 40 percent and the swelling power of the higher alcohols is extremely low. The swelling power of furfural is low but that of the furfuryl alcohol is quite appreciable.

The effect of the addition of various chemicals on the swelling power of water was also determined. Low concentrations of alum, alkali, black liquor and rosin have no effect on the swelling power of water toward cellulose fibers. Swelling experiments were also

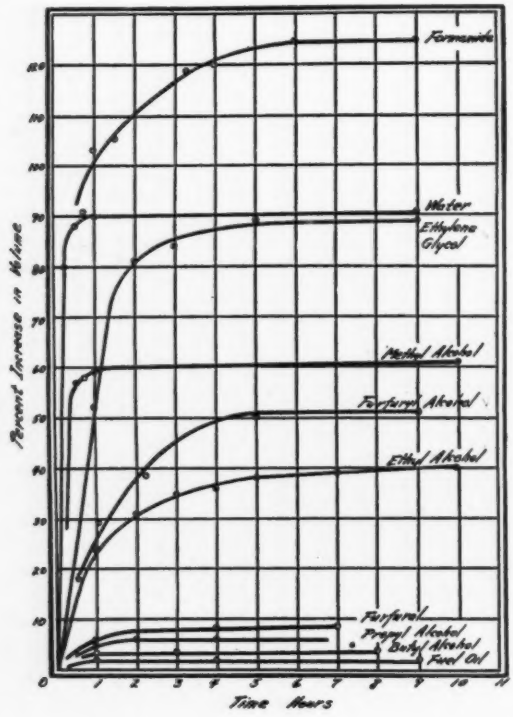


FIG. 4

Comparative rate of swelling of cellulose fibers in various pure liquids.

FIG. (f) BEATEN 1½ HOURS IN ETHYLENE GLYCOL.

Unbleached mitscherlich spruce sulphite pulp.

made on beaten stocks. Samples of stock at various stages of beating were allowed to air dry, and their swelling values were determined using water as the swelling medium. Little change could be observed in the degree of swelling as the beating progressed, the increase in volume for the materials at various stages of beating was 80 percent in each case.

These swelling experiments confirm the idea, that swelling of the fibers is necessary in order to produce hydration effects. Water has a high swelling power toward cellulose fibers and hydration effects can be produced, but fuel oil and the higher aliphatic alcohols have little swelling power and effects similar to hydration are not attainable with these liquids. Formamide and ethylene glycol have a rather high swelling power toward cellulose and one would predict that these liquids would produce beating effects similar to water. Methyl alcohol has an appreciable swelling power toward cellulose, and this swelling may be great enough to produce effects which approach those produced by beating in water.

Beating in Ethylene Glycol

Ethylene glycol is a di-hroxy alcohol, its structural formula is

The glycol used in the beating experiment was anhydrous, and the pulp was bone dry when furnished into the laboratory beater. The stock could be furnished readily into the beater and no trouble was experienced in breaking down the stock. The beating conditions were the same as in the previous beating experiments, but after ninety minutes beating, the stock became very slow and circulated with difficulty. Samples were taken at intervals, the glycol was removed by washing with water and sheets were prepared. The initial freeness was 840 and after ninety minutes beating the freeness dropped to 140, this was much lower than beating in water under similar conditions. The resulting handsheets had a strength comparable with sheets of water beaten stock. The sheets from the highly beaten stock resembled glassine, and they were well parchmentized as shown by the blister test. The sheets also showed a high water and grease resistance. A microscopic study of the fibers beaten in glycol revealed extensive fibrillation with little cutting action, Fig (f).

TABLE V.—PHYSICAL TESTS ON HAND SHEETS PREPARED FROM PULP BEATEN IN VARIOUS PURE LIQUIDS

Marks	Ream wt. (24x36–480)	Mullen×100 / Ream wt. (24x36–480)	Folding endurance	Oil penetration	Valley size tester	Freeness	Ink flotation
Water, unbeaten	51 lbs.	85%	2973	0	1 sec.	840	0 min.
Water, beaten 80 minutes	49	101	1309	4 min.	30 sec.	360	1.5 min.
Water, beaten 160 minutes	47	109	895	21 min.	35 sec.	170	70 min.
Water, beaten 240 minutes	52	135	37	120 min.	45 sec.	90	120 min.
Ethylene glycol, unbeaten	55	34	6	0	2 sec.	825	0 sec.
Ethylene glycol, beaten 60 minutes	48	98	423	30 min.	7 sec.	270	25 sec.
Ethylene glycol, beaten 90 minutes	46	100	252	120 min.	12 sec.	140	90 sec.
Methyl alcohol, beaten 2 hours	48	82	150	5 min.	7 sec.	340	10 sec.

TABLE VI

Marks	Ream wt. (24x36–480)	Mullen×100 / Ream wt. (24x36–480)	Folding endurance	Oil penetration	Valley size tester	Freeness	Ink flotation
Beaten in water, 2 hours	56 lbs.	86%	495	40 min.	35 sec.	200	30 min.
Beaten in formamide, 2 hours	55	80	730	30 min.	15 sec.	410	15 sec.

The results obtained by beating in ethylene glycol were very similar to those obtained by beating in water. Effects very similar to hydration had been produced. The fibers had been swollen and gelatinized, and the stock developed slowness much faster than when treated in water. The results of the physical tests on the sheets prepared from stock beaten in glycol are given in Table V. The values for sheets made from water beaten stock are given for comparison.

Beating in Methyl Alcohol

Bone dry pulp was furnished into the laboratory beater using water free methyl alcohol. The beater was included in a hood to remove the toxic vapors. The dry pulp could be furnished readily and the circulation was normal. The pulp disintegrated readily and the beating was continued for two hours. After this beating treatment the stock had become rather slow. The alcohol was removed by washing with water and hand sheets were made. The freeness of the stock after beating was 340, the initial freeness being 825. The hand sheets had a strength comparable with sheets prepared from water beaten stock, and the water and grease resistance were fairly good. Fig. g shows the fibers after 2 hours beating in methyl alcohol. The fibers have been fibrillated and they seem to have been swollen and gelatinized. The actual values of the physical tests on these sheets are given in Table V.

Beating in Formamide

Formamide has the chemical formula $HCONH_2$; it is a colorless liquid, slightly heavier than water. Due to the high cost of this material, the beating experiments were carried out in a ball mill.

A ball mill containing water was run on the same shaft with the one containing the formamide. The quantity of liquid, the amount of pulp and other conditions were the same in both cases. The beating was continued for 2 hours. The pulp was then washed with water and sheets were made. The strength of the sheets made from the stock beaten in formamide was practically the same as the strength of the sheets made from the water beaten stock. The water and grease resistance of the sheets from the formamide beaten stock were comparable with the values for the sheets prepared from the water beaten stock. The fibers beaten in formamide also showed fibrillation, Fig. h. The values for the physical tests on the handsheets prepared from stock beaten in formamide and in water, in the ball mill are as follows:

Beating in Glycerine

Glycerine in a tri-hydroxy alcohol, and its behavior on beating pulp should be quite similar to that of Ethylene glycol. Water free glycerine is a rather viscous liquid, and when the beating was attempted in the ball mill results were difficult to obtain. As the pulp was disintegrated, it formed a thick pasty mass with the glycerine, which interfered with the beating action. After about one hour of beating, the mass becomes so thick, that the

FIG. (g) BEATEN 2 HOURS IN METHYL ALCOHOL.
Unbleached mitscherlich spruce sulphite pulp.

FIG. (h) BEATEN 2 HOURS IN FORMAMIDE.
Unbleached mitscherlich spruce sulphite pulp.

pulp and the ball mill stones revolved as a unit and no further beating action was attained.

Rebeating Highly Hydrated Pulp

When a sheet of hydrated material such as glassine, is finely disintegrated in the dry condition, then put into a water suspension, and a sheet is immediately formed, the resulting sheet has lost all of the properties of the original sheet. The resulting sheet has lost in strength and also its water and grease resistance properties. Some well hydrated stock was prepared and allowed to air dry. The material in the air dry condition was a hard horny mass. It was then soaked in water for several days, and the stock again become soft with a greasy feel. This material was then furnished into the beater and beaten for one hour, with the roll off the plate, so that circulation and agitation reduced the stock rather than sharp beating action. The stock had a characteristic greasy feel and the freeness was practically the same as freeness of the stock after the first beating. Hand sheets from this rebeaten stock had good strength and good grease and water resistance, but these tests did not quite compare with the tests of the sheets prepared after the first beating.

The hydration of pulp therefore, seems to be a partially reversible process, the swelling of the dry hydrated stock is rather slow, due probably to the dense character of the material.

Conclusions

1. Practically no chemical changes insofar as the chemical constants, such as alpha content, copper number and soda soluble, have been observed in the various stages of beating an unbleached Mitscherlich Spruce pulp to a degree far in excess of a stock prepared mechanically for the production of commercial glassine.

2. The chemical changes noted with progressive beating in the cuprammonium viscosity determination and in the Schwalbe hydrolysis number are not, in our opinion, occasioned by chemical changes in the pulp but are caused solely by the fact that the fibre is more reactive, due to mechanical disintegration, with the result that a larger fibre surface is offered to the action of the reagents.

3. Air-dried and shredded pulps prepared from stock beaten to a condition suitable for commercial glassine production are as free as the original pulp, and when made into hand sheets without undue contact and agitation in water, a sheet is produced which is somewhat similar in physical properties to a sheet of air-dried groundwood pulp. The sheet prepared in this manner is of low strength, has very little grease and ink resistance and does not have any of the physical characteristics or appearance of the grease-proof sheet which would be prepared from the beaten wet stock.

4. The air-dried and shredded stock which had been beaten to the glassine condition, when allowed to lie in water or preferably when agitated in water, swells and becomes slow. The sheet prepared from such wetted stock compares in strength, grease and ink resistance and in its physical properties with a true grease-proof sheet such as would be prepared from the undried beaten pulp. These experiments indicate clearly that the so-called colloidal characteristics of the beaten stock are reversible and that by mere contact with water it is possible to pass from the different physical characteristics of the dry stock to the characteristics possessed by the original beaten wet pulp.

5. Experimentally, we have definitely shown that during the so-called hydration, water does not chemically combine with the pulp and that no hydrates of the pulp exist. The term "hydration" is therefore a misnomer and might better be replaced with the term "gelatinization" or "swelling" to describe the physical changes which occurred during beating.

6. Experimentally, we have adapted and developed the technique of the use of the dilatometer to measure the swelling power of fibres with the various liquids used in studying the beating of pulp.

7. The dilatometer measures directly the swelling power of the different liquids used, and such swelling power corresponds directly with the degree of beating under similar conditions which can be obtained with any liquid when the degree of beating is measured by freeness, strength and grease and ink resistance developed during the beating operation.

8. Such liquids as we have studied that have a hydroxyl or potential hydroxy group and a high dielectric constant show both a high rate of swelling as measured by the dilatometer and also hydrate stock on beating as measured by strength, freeness, grease and moisture resistance of the stock.

9. Such liquids as we have studied, which showed the swelling action as measured by the dilatometer and also hydrating ability, had a high dielectric constant. Conversely, liquids of low dielectric constants did not have swelling or hydrating ability.

10. No appreciable difference in the rate of adsorption of acid, alkali or rosin size could be noted for pulps beaten in varying degrees in water to the glassine condition.

11. No increase could be noted in the adsorption per unit weight of stock of basic, acid or direct colors for pulps beaten to varying degrees and to the glassine condition. With increase in beating, as is well known, a decided increase in tinctorial strength of the sheet occurs, but this increase in color strength is not due to an increase in adsorption of dyestuff but is occasioned by physical changes in the sheet which produce the increased color effect.

12. The so-called hydration of cellulose fibres by mechanical treatment or beating is associated with decided physical changes and with only minor chemical changes. Our experiments indicate clearly that these physical changes are mainly occasioned by the swelling of the fibres by the liquid in which the stock is beaten, with the result that there is an increase in the volume of the fibres. In the wet, swollen conditions the fibres are low in strength but are highly plastic and ductile, and any mechanical action will tend to bruise and fibrillate the fibres rather than to produce a sharp, cutting action. The hard, close nature of the paper made from so-called hydrated stock seems to be due entirely to the fibrillation of the fibres and the shrinking of the fibres when the liquid producing the swelling and imbibition is removed by drying. Liquids which do not possess the swelling power toward fibres, such as fuel oil and the higher alcohols, do not gelatinize pulp upon mechanical treatment, while liquids which show a high or a proportionate swelling power gelatinize pulp in proportion to their swelling power. Of all of the liquids examined, water fortunately seems to be the ideal medium for swelling the fibres so that by mechanical action they can be fibrillated and mechanically split and divided.

13. Further work will be done with the dilatometer using water and organic liquids to determine if a relationship can be established between the dilatometer readings and the strength, freeness and other characteristics of various pulp.

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POWER PLANT SECTION

REDUCING POWER COSTS THROUGH UNIT TREATMENT

Conducted by **Reginald Trautschold Consulting Engineer**

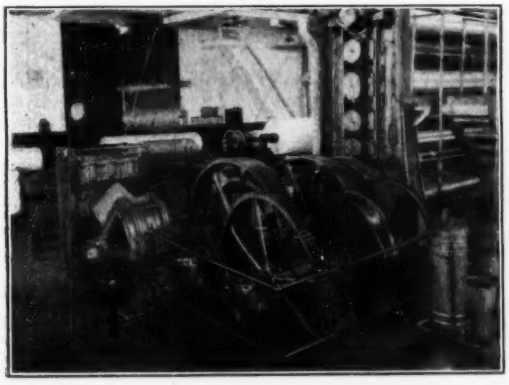
Advance in Electric Drives and Controls

Flexibility and Simplicity Governing Considerations

In a process industry, such as is essentially that of paper making, where the use of steam at high, low and intermediate pressures is extensively entailed and where thermal operations may be said to predominate, electrification has probably done more to revolutionize former mill practices and methods than any other modern development. The unexcelled flexibility of electric energy and the ease with which power in such form can be controlled, distributed and directed are responsible. Advance has been, and is, so varied and marked that notable improvements in mill equipment and operating methods are occurring continually, applications of electrification in which every progressive paper making establishment can find much of interest and, frequently, much of value.

Heavy capital investment may be entailed, it is quite true, or investments already made may prohibit immediate advantage being taken of some promising improvement or development, but no mill looking forward to bigger and better business can afford to overlook possibilities of following the lead of establishments successfully modernizing their mills. Admittedly, all developments giving promise of proving very effective in reducing production costs, improving product or bettering operating conditions to not live up to expectations in all respects, but developments of demonstrated merit in actual mill service are very apt to do so. These, at least, should be made familiar to the industry at large.

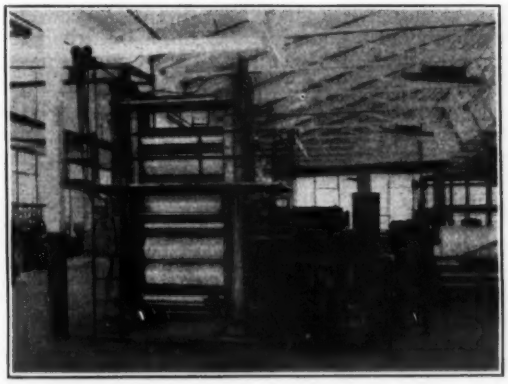
It is in this category of successful developments that the following two of the newer developments fall; an improved 2-motor super-calender drive installed at the Champion International Company (Lawrence, Mass.) and the very extensive electric switching equipment system which has been placed in service at the Southern Kraft Corporation at Panama City, Fla. These developments, it may be claimed, are in unrelated lines, but they nevertheless well exemplify what may properly be termed recent advance in electric drives and controls. They may or may not be generally applicable, but they are certainly well deserving of careful investigation by the industry. The following descriptions, consequently, should be of especial interest, having been prepared by engineers directly concerned with the respective developments.



Courtesy: General Electric Co.

FIG. 1

Single-motor, super-calender drive with double clutch control.



Courtesy: General Electric Co.

FIG. 2

Double-motor, super-calender drive with open gearing.

The Modernization of the Super-Calender Drive[1]

For satisfactory operation, there are certain operating features which any successful super-calender drive must provide. These are: 1st, a constant low speed for threading in purposes of about 40 or 50 feet per minute; 2nd., a calendering speed which must be adjustable over a range of at least 2 to 1; and 3rd., there must be a smooth acceleration from the threading speed to the calendering speed. These essentials are best brought out, however, by a brief exposition of various stages in the development of approved super-calender drives.

The first super-calenders were driven for the most part from a constant speed line shaft through pulleys, belts and gearing. Two constant speeds were available, one for threading and the other for calendering. By manipulating friction clutches, the calender could be operated at either

speed, but there were no provisions for adjustable calendering speed. Furthermore, such a drive takes up considerable space in a mill and is very apt to require excessive maintenance. The open gearing customarily used is noisy and unless unusually well protected, is decidedly dangerous.

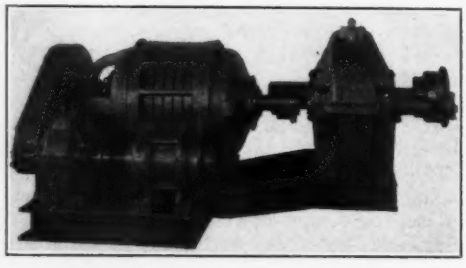
The next stage, or step, in the development of the modern super-calender drive, in keeping with the general trend towards the application of individual motors to machines used in all branches of industry, was the introduction of the single motor drive, either of the alternating or direct current varieties. Here, the line shaft was replaced by the adjustable speed motor and the threading speed was secured by using a clutch and extra set of reduction gears between the main motor and the calender roll.

A simplification of this single motor, adjustable speed drive followed and was effected by introducing a second constant speed motor to replace the threading clutch and gearing. This double motor drive has all the operating characteristics the calendering cycle requires, the use of a ratchet type of over-running clutch between the two motors permitting a smooth transfer from one motor to the other and the adjustable speed of the main driving motor effecting the desired adjustment of the calendering speed.

Where an individual super-calender is to be driven, the double motor drive is still the best obtainable when the first cost as well as the operation is a dominant consideration, but a great deal has been done to improve the operation and appearance of this form of drive, by the introduction of enclosed, oil immersed gearing. In a modern alternating, 2-motor super-calender drive the open gearing is all replaced with high-efficiency herringbone gears, quiet in operation, fully protected and requiring little maintenance. The threading motor is connected to the over-running clutch through a herringbone gear and a silent chain drive, both of which are enclosed. Flexible couplings between the motors and the gears and between the main gear and the super-calender make each drive an individual unit, with a resultant decrease in line-up difficulties. The space requirements in the mill are greatly reduced and the operating hazard is practically negligible.

The control for these double motor drives has also been greatly simplified. Push buttons control the jogging, or threading, speed and a drum controller permits the transfer from threading to calendering speeds in one operation, since the threading motor is automatically disconnected from the line when the main driving motor is in operation. Emergency stop stations are provided with electrical braking, by momentary plugging on the alternating current drives and by dynamic braking on the direct current drives.

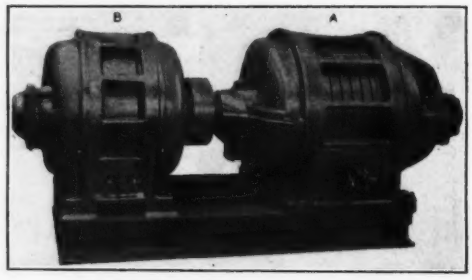
Where a battery of three or four super-calenders is to be driven, the dual frequency type of drive, now made available for use in mills supplied with any commercial voltage or frequency, can be used to advantage, simplicity in operation and control being the outstanding features of



Courtesy: General Electric Co.

FIG. 3

Modernized type of double-motor, super-calender drive with enclosed gearing, installed at the Champion International Company, Lawrence, Mass.



Courtesy: General Electric Co.

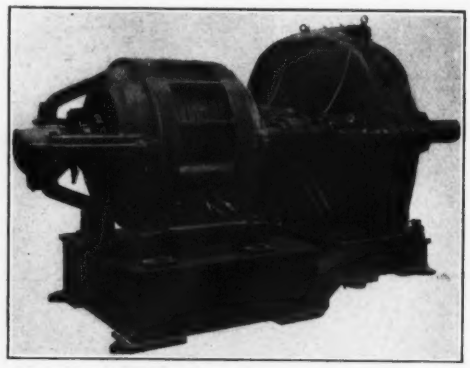
FIG. 4

Low frequency converter set, consisting of standard squirrel cage induction motor (*B*) driving a self-excited (2.5 to 5 cycle) alternating current generator (*A*).

the dual frequency drive. Only one motor is required for each super-calender, the over-running clutch and the threading motor with its gearing being omitted.

The threading speed is secured by connecting the main motor to a power supply of low frequency and low voltage, the speed of an alternating current induction motor depending upon the frequency of its current supply. Thus, the threading speed is obtained by providing a power supply having a frequency bearing approximately the same relation to the main line frequency as the threading speed bears to the calendering speed. This low frequency, low voltage power supply is secured from a special motor-converter set, consisting of a standard squirrel cage induction motor designed for any voltage or frequency and a direct connected alternating current generator. The latter, while it may operate at a speed of approximately 1,200 revolutions per minute, generates power at only 2½ to 5 cycles, depending upon the threading speed required. The generator is self-excited and is not connected electrically with the mill power supply. It should be designed with sufficient capacity to operate the whole battery of super-calenders during the threading in period, so that in effect it provides a low frequency voltage power bus from which each of the super-calender motors can be operated during the threading period.

The control equipment for this dual frequency drive is also exceedingly simple, the operations of threading and calendering being controlled from one drum controller. When the operator places the controller in the first position, a line contractor closes and connects the motor to the low voltage, low frequency bus bar and the motor accelerates to the threading-in speed. The next position of the drum controller disconnects the motor from the low frequency bus and connects it to the mill power bus, with all the resistance in the secondary on the motor. Further



Courtesy: General Electric Co.

FIG. 5

Modern, dual frequency, super-calender drive with enclosed gearing.

points of the drum controller cut out, step by step, the secondary resistance, permitting the motor to accelerate up to the desired calendering speed. Electrical braking by momentary plugging should also be provided.

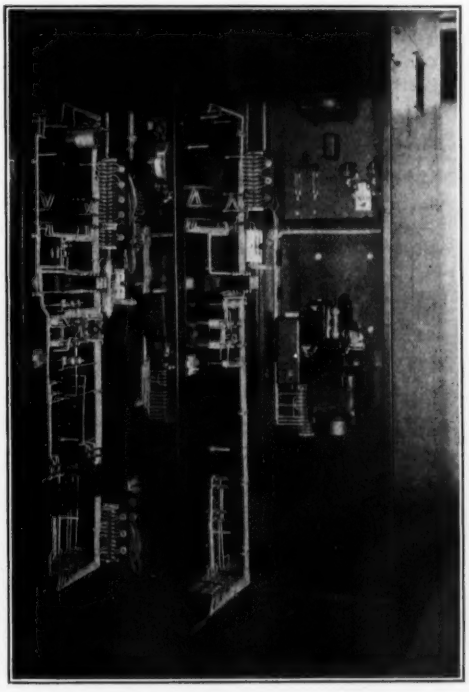
The dual frequency super-calender drive thus provides all the best operating features of any drives so far developed, with a low first cost and a minimum maintenance charge burden. The space requirements are less than are needed for mounting other varieties of drives and the danger to operators from open gearing or other mechanical equipment is entirely avoided.

Switchgear Cubicles in the Paper Industry[2]

In the early part of this year, the Southern Kraft Corporation of Panama City, Fla., placed a new power plant in operation and installed extensive switching equipment to handle its output. By reason of the metal enclosed feature and the simplicity of installation, the newly developed cubicle type of enclosed switchgear was selected. Completely wired and assembled units permitted shortening considerably the period usually required to place the extensive new equipment in service, as a result, despite the numerous motor-power demands in the paper mill operation, and a very complete and convenient installation was effected.

The power plant equipment consists of three steam turbine-generators rated at 2,300 volts, 60 cycles, with outputs of 750, 4,000 and 7,500 kilowatts respectively, together with the necessary exciters and voltage regulators These units supply the forty-five buses required in the cubicles to facilitate individual control of the various feeder and machine circuits. The 2,300-volt buses supply several three-phase feeders, ranging in capacity from 150 to 600 amperes, two 150 kilowatt motor-generator sets, six 125-horsepower and twenty 350-horsepower synchronous motors. The motor circuits are provided with interlocks which prevent the starting of more than one motor at a time.

[1] By F. M. Roberts, Industrial Engineering Department, General Electric Company.
[2] By F. E. Jaquay, Switchgear Department, General Electric Company.



Courtesy: General Electric Co.

FIG. 7

Interior of alternating current feeder cubicle.

Courtesy: General Electric Co.

FIG. 6

Complete installation of indoor cubicles for paper mill drive installed at the Southern Kraft Corporation of Panama City, Fla.

The bus voltage of 2,300 permits compact construction, so that the entire group of cubicles occupies a relatively small floor space, being installed in two groups, each 46 feet long, with an intervening space. The individual cubicle units are each 2 feet wide, 10 feet high and 4 feet 6 inches deep. A space of 4 feet at the back allows ample room for access to the oil circuit breakers and for their removal when necessary.

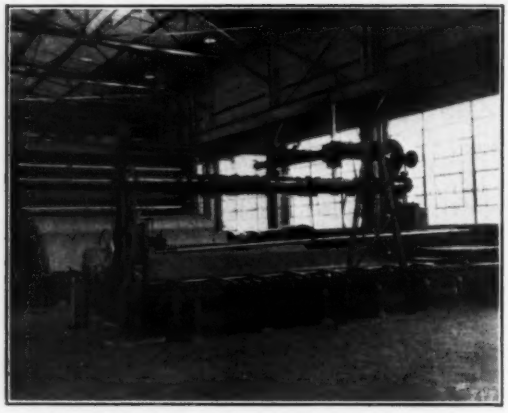
The oil and air circuit breakers, field switches, governor control motors and field rheostats are all electrically operated from control switches mounted on the front of the panels and, as a large part of the plant equipment is required to function under various degrees of moist atmosphere, a rust resisting finish was applied to the cubicles, as well as to other exposed apparatus. The essential instruments are furnished with water-tight cases mounted on brackets on the motors. The cubicles for the generator breakers and the disconnecting switches are mounted on the floor beneath the switchboard rooms.

The details of the cubicle construction are now, in general, fairly well known, but this particular application was somewhat broadened so that any other type of switchboard would be unnecessary. Knife-switches for the direct current exciter line circuits are mounted on panels back of the front doors of the cubicles, so that they are readily accessible with the door open, while the steel barrier, on which the solenoid operating mechanism is mounted, separates the front of the compartment from the high-voltage connections to the breaker in the rear. The buses are mounted on the superstructure and more than half of the units provide individual control for the various synchronous motors used to drive beaters, pulp machines, etc.

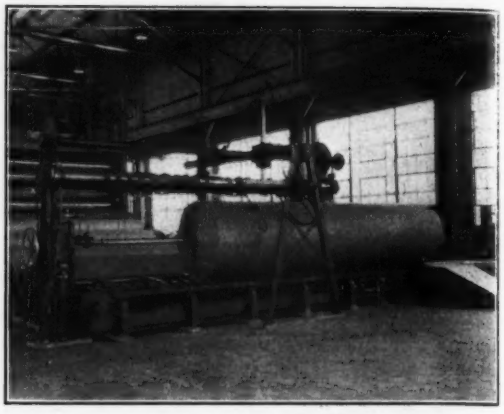
Simplicity, Compactness and Safety

These two quite recent developments, the dual frequency super-calender drive and the switchgear cubicle system of individual control of feeder and machine circuits, are representative of the modern trend towards greater simplicity, compactness and safety in practices, methods and equipment. Not only this, but towards more efficient and cheaper constructions. They represent important advance in the reduction of operating costs and should prove very valuable aids in assuring continuous and satisfactory plant operation.

It is the incorporation of refinements in equipment such as these that distinguish the truly progressive establishment, that makes possible the profitable operation of a mill during bad as well as good times.



WINDER SHOWING SHAFT TRANSFER IN OPERATION



WINDER SHOWING SHAFT PULLEY IN OPERATION

Beloit Patented Automatic 2-Drum Winder

Several errors occurred in the article describing the mill of the Southern Kraft Corporation at Panama City, Fla., in the Mill Number of the PAPER TRADE JOURNAL. The article states that each of the 234 inch Fourdriniers built by the Beloit Iron Works has two suction presses, one straight press and smoothing rolls. This is incorrect. The machines are each equipped with Beloit first and second suction presses and a smoothing press. The addition of a Beloit second suction press makes the third press unnecessary. This can be converted into a smoothing press at a great saving. It also increases the production because the sheet goes to the driers with less moisture, or the third press can be removed and the space filled in with driers which permits increase in speed and production.

The silent chain drive for the drier section is a patented duplex silent chain drive which the Beloit Iron Works have developed.

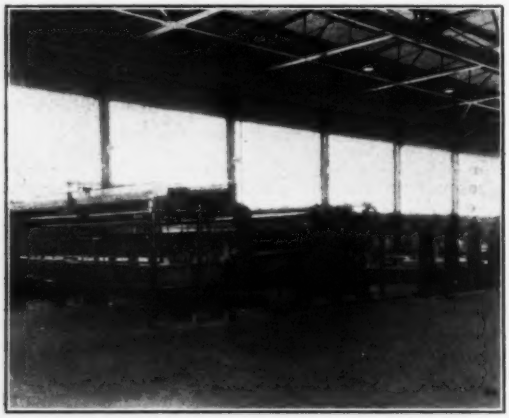
The winders on both of these machines are the improved Beloit double-drum winders. These winders have the new and novel features of automatically ejecting from the winder the full rolls of paper and automatically removing the heavy winder shafts from the rolls of paper and delivering the rolls to a finishing table or to a conveyor and then placing the shaft back in its bearings, ready for use again. These features are strictly of Beloit design, developed especially to meet the severe duty of rapid work, handling large production on high speed machines and these features are fully covered by patents.

The 222 inch heavy duty duplex cutter mentioned in the article is a Beloit cutter of special design and it is said is the widest cutter built up to this time.

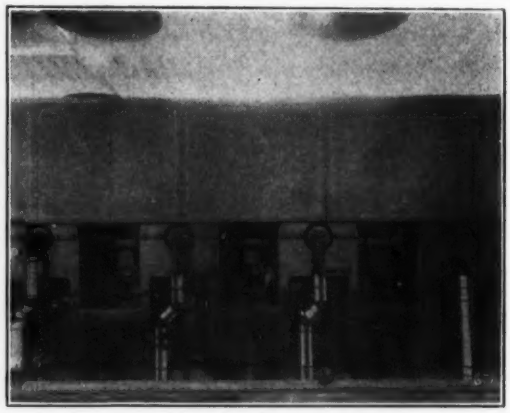
Japanese Paper Exports

WASHINGTON, D. C., November 9, 1931—Exports of paper and board from Japan during the first 7 months of this year which totalled 57,636 short tons valued at $7,176,000 were about on a level, so far as volume is concerned, with those of the corresponding period of last year according to a report to the Department of Commerce

The total value of these products, however, shows a decline of 10 per cent. Printing papers, which totalled 38,040 tons, were 7 per cent above those for 1930, while boards show an increase of 10 per cent and cigarette papers 30 per cent. Exports to China, which takes between 65 and 70 per cent of the total shipments in this line, declined by 5 per cent this year. There was a still heavier decrease, 35 per cent, in shipments to Kwantung, while those to Hongkong increased by 30 per cent.



FRONT VIEW OF BACK ROLL STANDS, CUTTER AND LAYBOY



DRIER SECTION SHOWING CHAIN DRIVE—REAR VIEW

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CALENDERS: Paper
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See PAPER AND PULP MILL CATALOG
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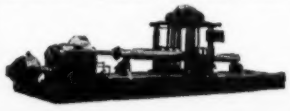

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— *rolls of uniform density?*

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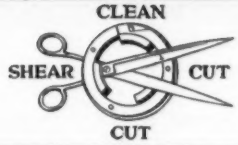

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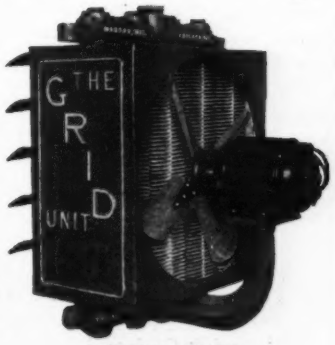

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T. D. Downing & Co., Transylvania, Glasgow, 77 bls. bagging.
——, Transylvania, Glasgow, 39 bls. paper stock.
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Irving Trust Co., Statendam, Rotterdam, 51 bls. cuttings.
H. G. Lichtenstein, West Eldara, Antwerp, 168 bls. bagging.
Banco Coml Italiana Trust Co., St. Louis, Hamburg, 56 bls. rags.
——, Sagoporack, Leningrad, 144 bls. rags.
Castle & Overton, Inc., Gripsholm, Gothenburg, 141 bls. rags.
Bank of N. Y. & Trust Co., Lucia C., Trieste, 47 bls. rags.
Katzenstein & Keene, Inc., Pres. Hoover, Yokohama, 6 bls. rags.
J. Cohen & Son, Coelleda, Manchester, 10 bls. new cuttings.
Darmstadt Scott & Courtney, Coelleda, Manchester, 15 bls. new cuttings.
Castle & Overton, Inc., Waukegan, Havre, 46 bls. bagging; 5 bls. rags.
V. Galaup, Waukegan, Havre, 48 bls. rags.
L. Rosenbaum Co., Waukegan, Havre, 35 bls. rags.
H. W. T. Mali & Co., Waukegan, Dunkirk, 78 bls. rags.
Darmstadt Scott & Courtney, Waukegan, Dunkirk, 36 bls. rags.
——, Pres. Roosevelt, Hamburg, 155 bls. bagging.
Chase National Bank, Deutschland, Hamburg, 76 bls. rags.
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——, Augvald, Barcelona, 136 bls. bagging.

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——, Pres. Roosevelt, Hamburg, 60 coils.

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L. A. Salomon & Bro., Adriatic, Liverpool, 140 bags.

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Castle & Overton, Inc., Statendam, Rotterdam, 140 bls. wood pulp.
——, Stavangerfjord, Gothenburg, 300 bls. wood pulp.
Atterbury Bros., Inc., Stavangerfjord, Oslo, 1500 bls. mechanical pulp.
E. M. Sergeant & Co., Stavangerfjord, Oslo, 300 bls. wood pulp.
Perkins Goodwin & Co., Gripsholm, Gothenburg, 381 bls. sulphite.
Parsons & Whittemore, Inc., Gripsholm, Gothenburg, 360 bls. sulphate.
E. M. Sergeant & Co., Gripsholm, Gothenburg, 699 bls. kraft pulp; 250 bls. mechanical pulp.
Johaneson Wales & Sparre, Inc., Gripsholm, Gothenburg, 748 bls. kraft pulp; 209 bls. sulphite.
Castle & Overton, Inc., Deutschland, Hamburg, 280 bls. wood pulp, 56 tons.
Bulkley Dunton & Co., Kelkheim, ——, 2375 bls. wood pulp.
Bulkley Dunton & Co., Kungsholm, ——, 1260 bls. wood pulp.

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The Burnet Co., Statendam, Rotterdam, 1000 bags.

(Continued on page 52)

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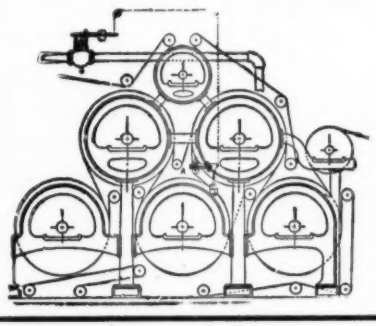

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Imports of Paper and Paper Stock

(Continued from page 50)

State Chemical Co., Statendam, Rotterdam, 1500 bags.

A. Kramer & Co., Statendam, Rotterdam, 200 bags.

Corn Exchange Bank & Trust Co., Statendam, Rotterdam, 100 bags.

B. L. Soberski, Stavangerfjord, Frederickstad, 1502 bags.

ALBANY IMPORTS

WEEK ENDING NOVEMBER 7, 1931

Perkins Goodwin & Co., Irland, Norrsundet, 15,000 bls. sulphate, 3,000 tons.

Amtorg Trading Co., Sagoporack, Leningrad, 2582 Cords pulpwood.

A. P. W. Paper Co., Dago, Sheet Harbor, 6806 bls. wood pulp, 1523 tons.

PHILADELPHIA IMPORTS

WEEK ENDING NOVEMBER 7, 1931

Union Waste Co., Tai Ping Yang, Kobe, 25 bls. wipers.

Phila. National Bank, Waukegan, Havre, 27 bls. rags.

Castle & Overton, Inc., Waukegan, Havre, 45 bls. rags.

Katzenstein & Keene, Inc., Waukegan, Havre, 198 bls. rags.

Phila. National Bank, Waukegan, Dunkirk, 46 bls. rags.

Detroit Waste Works, Waukegan, Dunkirk, 4 bls. rags.

J. M. Hagy Waste Works, Waukegan, Dunkirk, 49 bls. rags.

Bulkley Dunton & Co., Elza Mentzel, ——, 1625 bls. wood pulp.

Russell McCandless, Seattle Spirit, Hamburg, 179 bls. bleached sulphite.

BOSTON IMPORTS

WEEK ENDING NOVEMBER 7, 1931

T. D. Downing & Co., Coelleda, Manchester, 62 bls. paper stock.

Bulkley Dunton & Co., Roxen, ——, 1840 bls. wood pulp.

BALTIMORE IMPORTS

WEEK ENDING NOVEMBER 7, 1931

Bulkley Dunton & Co., Wanja, ——, 2625 bls. wood pulp.

Bulkley Dunton & Co., Elza Mentzel, ——, 7125 bls. wood pulp.

Bulkley Dunton & Co., Hannover, ——, 2600 bls. wood pulp.

George Little Dead

DAYTON, Ohio, November 9, 1931.—Death claimed George Little at 4 a.m., November 4, at his home, 510 North King street, Xenia, near Dayton, following an ailment that had continued since last Spring. He was conspicuous in business and paper manufacturing circles. He launched his commercial career by becoming manager of the Miami Telephone Company in Xenia when his father was president of that company, and later became prominently identified with the paper trade, being heavily interested in paper mills in Franklin, Ohio; Sandusky, Ohio, and other places.

Mr. Little had been president of the Xenia National Bank for ten years, and two years ago, upon the death of J. D. Steele, he was elevated from director to president of the Hooven & Allisan Company, manufacturers of rope and twine in Xenia. At the time of his death he was one of the chief owners of the Franklin Board and Paper Company at Franklin in the Miami Valley, and Vice-President of the Hinde & Dauche Paper Company of Sandusky. A few years ago he was president of the Hagar Straw Board and Paper Company, at Cedarville, near Xenia, having been at the head of that concern for a number of years, during which time the mill was remodeled and improved.

Mr. Little was a director of Antioch College since its reorganization under the well-known Antioch plan of cooperative student work ten years ago, and had many friends in educational and business circles throughout Ohio. He was prominent in Masonic circles, being a member of Xenia Lodge No. 49, F. and A.M., Scottish Rite, 32nd degree, Valley of Dayton; Antioch Temple, Knights Templar and Dayton and Xenia lodges of Benevolent and Protective Order of Elks.

Mr. Little was married February 25, 1903, to Miss Susan Matilda Paullin of Ross township, Green county, Ohio, who died in January, 1916. Surviving are three daughters and a son, Mrs. Eddy W. Eckey, Wyoming, Ohio; Misses Helen and Barbara, at home; and John Little, a student in a California college. He also leaves a sister, Mrs. Mary Little Dice, Xenia.

Funeral services were conducted at his home Saturday, November 7. His son, John, came by airplane to Columbus, Ohio, arriving on the afternoon of November 5 from the California Institute of Technology at Pasadena. Many members of the paper industry and others who are prominent in business circles attended the rites.

Improvement in Watertown Section

WATERTOWN, N. Y., November 2, 1931.—A general trend toward better conditions is seen in reports from the principal paper mills in this city. The improvement has been making itself felt through an increased volume of orders for several weeks past with the result that some plants are running near capacity.

At the mill of the Taggart Paper and Bag Company there is reported a marked improvement in business in recent weeks and the outlook is considered good. The bag plant is running three nights weekly in addition to capacity day schedules necessitated by the orders for flour and cement sacks of the multi-wall variety. The mill is employing about 150 hands and the outlook is claimed to be better now than for some time. Orders at the Herrings mill are also increasing and the bag manufacturing departments are running on full time.

Conditions at the mills of Knowlton Brothers, Inc., are also taking a trend upward and about 120 hands are finding steady employment. Operations are being conducted on a five-day-weekly basis, these schedules having been in effect since the first of the year. Increased orders have resulted in the firm taking an encouraging outlook towards the coming winter. The firm turns out high grade colored specialty papers.

Officials of the Bagley & Sewall Company report an improvement in buisness in the small order department which is busier than usual. The company is manufacturing and shipping numerous orders for the various parts of paper machinery besides being engaged in competitive bidding on a number of contracts which it hopes to secure.

The Coty Bag Machine Company claims that business is good and orders on the books are said to be sufficient to guarantee steady work for the next four months. The company turns out equipment of labor saving qualities for which the demand is good. Officials said that they had recently received a number of small orders and were now bidding on two large contracts. Inquiries from prospective purchasers are also more plentiful and the belief was expressed that there is a swing upward in business conditions.

Another industry experiencing a prosperous season is the Spies Manufacturing Company, producers of coin cards. Upon the death of the late John Spies the business was taken over by a number of the employees and carried on so successfully that a bonus was recently voted. Orders continue plentiful and there have been no reductions in forces or curtailed schedules placed in effect.

100 Tons Kraft Per Day — 58% A. D.
With the Famous Kamyr Wet Machine

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Kraft	up to 100 Tons
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Soda	up to 60 Tons
Groundwood	up to 50 Tons

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With 2 Presses	55% A.D.
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New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, November 11, 1931.

Trading in the local paper market during the past week was moderately active. While the prevailing demand is below normal for the time of the year there are a number of inquiries around, some of which should materialize into good business. Sales forces of the leading paper houses are fairly optimistic. Prices continue irregular.

News print production in the United States and Canada is being maintained at approximately 56 per cent of rated capacity, according to information gathered by the News Print Service Bureau. Shipments are going forward to the publishers in fairly satisfactory volume. The price situation continues unsatisfactory.

The paper board market is rather quiet at present. Box board production and orders have fallen off. Prices are easy. Some improvement was noticed in the fine paper market. Book and bond papers are in better request. Tissues are moving in seasonal volume. The coarse paper market is fairly active and kraft wrapping paper is steadier.

Mechanical Pulp

Offerings of both domestic and imported ground wood pulp are large enough to take care of current requirements. Production, both at home and abroad, has been curtailed, with the result that there are no undue accumulations and the industry is in a sound statistical position. Prices are generally holding to formerly quoted levels.

Chemical Pulp

Despite the uncertainty caused by the foreign exchange situation, the chemical pulp market is exhibiting a fairly steady trend. Demand for the various grades of domestic and imported chemical pulp is fairly persistent considering the general business depression. Prices are generally holding to schedule.

Old Rope and Bagging

The old rope market continues dull. Demand for domestic and imported manila rope is restricted. Prices are weaker. Foreign manila rope is now offered at from $1.55 to $1.60. Domestic manila rope is selling at from $1.75 to $1.90. The bagging market is spotty. Demand for scrap and roofing bagging is light. Gunny is moving slowly.

Rags

Paper mill interest in the domestic rag market is restricted. Cotton rags are quiet and demand for roofing grades has fallen off. Mixed rags are listless. Quotations on domestic rags are decidedly easy at present. The imported rag situation continues involved, due to the uncertainty of foreign exchange. Prices are weak.

Waste Paper

Demand for the various grades of paper stock has quieted down somewhat. The board mills are not showing as much interest in the lower grades. In some quarters this situation is regarded as temporary, as it is believed that stocks at the mills are not excessive and will shortly need replenishing. The better grades of waste paper are also less active.

Twine

Steadiness prevails in the local twine market. Sales booked during the past week were again well up to the average of the corresponding period of the preceding year. Inquiries for future needs are fairly numerous. Despite keen competition for extra desirable orders, prices are generally well maintained.

Japanese Paper Men Visit Mills

[FROM OUR REGULAR CORRESPONDENT]

WATERTOWN, N. Y., November 2, 1931.—Several officials of the Fuji Paper Company, Tokyo, Japan, have been in this section for the past two weeks as the guests of the Bagley & Sewall Company, during which they made a study of conditions. Included in the group were Y. Awyoama and son, R. Awyoama, and R. Okawa, all of the Fuji Paper Company. The Japanese concern is rated as one of the largest paper manufacturing concerns in the world with numerous branches under its control. Eleven of the machines used in the firm's mills were produced by the Bagley & Sewall Company. Y. Awyoama is chief engineer of the company and his son is chemical engineer. R. Okawa is general superintendent.

The group were met at Vancouver, B. C., late in August by C. E. Kinne, vice president of the local concern. During their visit to this country the paper mill men have made an inspection of many of the leading paper mills in Northern New York and Canada. Among the plants visited were the National Paper Products Company, Carthage; Moyer & Pratt Company, Lyons Falls; Taggart Mills, Oswego; Anglo-Canadian Company, P. of Quebec; International Paper Company, Three Rivers, Quebec; E. B. Eddy Company, Hull, Quebec; and the Kenwood Felt Company, Arnprior, Ontario. The visitors left Watertown late last week planning to return to Tokyo. Whether or not they carried on negotiations relative to the placing of orders for new paper machines with the local concern could not be learned.

F. A. Johnson Heads Superintendents

[FROM OUR REGULAR CORRESPONDENT]

SYRACUSE, N. Y., October 31, 1931.—Frank A. Johnson, superintendent of the Sherman Paper Co., Watertown, was elected president of the Northern New York division of the National Association of Pulp and Paper Mill Superintendents at the convention held last week in this city. Mr. Johnson presided at the gathering which was largely attended. Other officers chosen were as follows: B. D. Millidge, of the Howard Smith Paper Mills, Ltd., Cornwall, Ont., first vice president; John Nolan, International Paper Company, second vice president; George M. Pomeroy, Harrisville Paper Company, third vice president, and Donald W. Hynes, Newton Falls Paper Company, secretary-treasurer.

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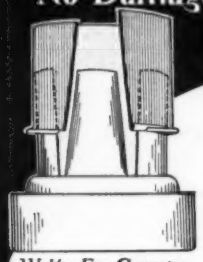

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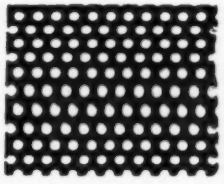

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Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, November 11, 1931.

BLANC FIXE.—No radical changes were reported in the blanc fixe market. The contract movement is seasonal. The pulp is still quoted at from $42.50 to $45.00 per ton, while the powder is selling at from 3¾ cents to 4½ cents per pound, in barrels, at works.

BLEACHING POWDER.—The bleaching powder market is exhibiting a strong undertone. Contract shipments are going forward in good volume. Prices are holding to schedule. Bleaching powder is quoted at from $1.75 to $2.00 per 100 pounds, in drums, at works.

CASEIN.—Demand for casein is restricted. Domestic standard ground is quoted at 7 cents and finely ground at 7½ cents per pound. Argentine standard ground is selling at 8½ cents and finely ground at 9½ cents per pound, all in bags, car lot quantities.

CAUSTIC SODA.—Steadiness prevails in the caustic soda market. Demand is fairly persistent. Solid caustic soda is quoted at from $2.50 to $2.55; while the flake and the ground are selling at from $2.90 to $2.95 per 100 pounds, in large drums, at works.

CHINA CLAY.—The position of the china clay market is unchanged. No further price changes have been reported. Imported china clay is quoted at from $11 to $18 per ton. Domestic paper making clay is selling at from $7 to $11 per ton, at mine.

CHLORINE.—Conditions in the chlorine market are fairly satisfactory. Demand from the paper mills is moderately active. Prices are holding to former levels. Chlorine is selling at $1.75 per 100 pounds, in tanks, or multi-unit cars, in ton lots, or over, at works.

ROSIN.—The rosin market is slightly weaker. The grades of gum rosin used in the paper mills are now quoted at from $3.90 to $4.00 per 280 pounds, in barrels, at works. Wood rosin is selling at $3.70 per 280 pounds, in barrels, on dock, car lot quantities.

SALT CAKE.—Quietness reigns in the salt cake market. Prices generally remain unchanged. Salt cake is quoted at from $15 to $16; chrome salt cake at from $13 to $14 per ton, in bulk, at works. Imported salt cake is selling at from $15 to $15.50 per ton, ship side.

SODA ASH.—The trend of the soda ash market is steady. Shipments against contract are fairly heavy. Prices are unchanged. Quotations on soda ash, in car lots, at works, per 100 pounds, are as follows: in bulk, $1; in bags, $1.25; and in barrels, $1.38.

STARCH.—Due to the improvement shown in the grain market, starch is decidely firmer. Prices have advanced ten cents per one hundred pounds. Special paper making starch is now quoted at $2.77, in bags; and at $3.04, in barrels per 100 pounds, at works.

SULPHATE OF ALUMINA.—Some improvement was noticed in the sulphate of alumina market. The contract movement is well up to average. Commercial grades are quoted at from $1.25 to $1.40; while iron free is selling at from $1.90 to $2.05 per 100 pounds, in barrels, at works.

SULPHUR.—The sulphur market continues steady. Sulphur is quoted at $18 per long ton on orders of 1,000 tons, or over, on yearly contracts; and at $20 per ton for any smaller quantity over that period. On spot and near by car loads, the quotation is $21 per ton.

TALC.—Most of the business transacted in the talc market during the past week was along routine lines. Domestic talc is still quoted at from $16 to $18 per ton, in bulk, at mine; while imported talc is selling at from $18 to $22 per ton, in bags, ship side.

Market Quotations

Paper

(F. o. b. Mill)

Ledgers	7.50	@	38.00
Bonds	6.00	@	53.25
Writings—			
Extra Superfine	14.00	@	32.00
Superfine	14.00	@	32.00
Tub sized	10.00	@	15.00
Engine sized	6.75	@	11.00
Book, Cased—			
S. & S. C.	5.25	@	—
M. F.	5.00	@	—
Coated and Enamel	6.75	@	10.25
Lithograph	7.25	@	11.75
Tissues—Per Ream—			
White No. 1	.65	@	.70
Anti-Tarnish M. G. only	.65	@	.70
Colored	.70	@	.90
White No. 2	.55	@	.60
Kraft	.65	@	.70
Manila	.55	@	.60
Manila—			
No. 1 Jute	9.00	@	9.25
No. 2 Jute	7.75	@	8.50
No. 1 Wood	4.00	@	5.25
No. 2 Wood	3.50	@	4.00
Butchers	3.37½	@	—
Fibre Papers—			
No. 1 Fibre	4.25	@	5.50
No. 2 Fibre	4.00	@	4.75
Common Bogus	1.50	@	3.00
Screenings	2.00	@	3.00
Card Middles	4.00	@	5.00
Glassine—			
Bleached, basis 25 lbs., No. 1	.09¼	@	—
No. 2	.11¼	@	—
Bleached, basis 20 lbs.	.11¼	@	—
(Delivered New York)			
News, per ton—			
Rolls, contract	57.00	@	—
Rolls, spot	57.00	@	—
Sheets	62.00	@	—
Side Runs	42.00	@	46.00
Kraft—			
No. 1 Domestic	4.50	@	5.75
No. 2 Domestic	3.00	@	4.25
Southern	2.75	@	4.00
Imported	6.00	@	7.00
Boards—per ton—			
News	26.00	@	27.50
Straw	34.50	@	45.00
Chip	25.00	@	27.50
Binders' Boards	62.00	@	70.00
Standard 85 Test Liner	32.50	@	35.00
Sgl. Mla. Lt. Chip	37.50	@	42.50
(F. o. b. Mill)			
Wood Pulp Boards	70.00	@	80.00

Mechanical Pulp

(On Dock)

No. 1 Imported—			
Moist	24.00	@	26.00
Dry	25.00	@	26.50
(F. o. b. Mill)			
No. 1 Domestic	25.00	@	30.00

Chemical Pulp

(On Dock, Atlantic Ports)

Sulphite (Imported)—			
Bleached	2.40	@	3.50
Easy Bleaching	2.00	@	2.10
No. 1 strong unbleached	1.75	@	2.15
Mitscherlich unbleached	1.80	@	2.10
No. 2 strong unbleached	1.70	@	1.80
No. 1 Kraft	1.50	@	1.75
No. 2 Kraft	1.40	@	1.50
Sulphate—			
Bleached	2.75	@	3.25
(F. o. b. Pulp Mill)			
Sulphite (Domestic)—			
Bleached	2.25	@	4.50
Easy Bleaching	2.15	@	2.35
News	1.80	@	2.50
Mitscherlich	2.40	@	2.55
Kraft (Domestic)	1.60	@	2.75
(Delivered Paper Mills)			
Soda Bleached	2.75	@	—

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	5.50	@	6.00
New White, No. 2	4.50	@	5.00
Silesias No. 1	4.50	@	4.75
New Unbleached	6.00	@	6.50
New Blue Prints	3.50	@	4.00
New Soft Blacks	3.50	@	4.00
Blue Overall	4.50	@	4.75
Fancy	2.50	@	2.75
Washables	2.25	@	2.50
Mixed Khaki Cuttings	3.00	@	3.25
Pink Corset Cuttings	4.00	@	4.50
O. D. Khaki Cuttings	4.50	@	4.75
Men's Corduroy	2.25	@	2.50
New Mixed Blacks	2.75	@	3.00

Old Rags

White, No. 1—			
Repacked	5.25	@	5.75
Miscellaneous	4.25	@	4.75
White, No. 2—			
Repacked	3.00	@	3.50
Miscellaneous	2.30	@	2.50
St. Soiled, White	1.50	@	1.75
Thirds and Blues—			
Repacked	2.25	@	2.50
Miscellaneous	1.65	@	1.85
Black Stockings	3.25	@	3.75
Roofing Rags—			
Cloth Strippings	.65	@	.70
No. 1	.70	@	.75
No. 2	.45	@	.50
No. 3	.40	@	.45
No. 4	.40	@	.45
No. 5A	.35	@	.40

Foreign Rags

New Rags

New Dark Cuttings	1.60	@	1.75
New Mixed Cuttings	1.75	@	1.85
New Light Sileasias	4.00	@	4.25
Light Flannelettes	4.00	@	4.25
Unbleached Cuttings	6.00	@	6.25
New White Cuttings	5.00	@	5.25
New Light Oxfords	4.00	@	4.25
New Light Prints	2.75	@	3.00

Old Rags

No. 1 White Linens	5.75	@	6.00
No. 2 White Linens	4.75	@	5.00
No. 3 White Linens	3.50	@	3.75
No. 4 White Linens	2.00	@	2.50
No. 1 White Cotton	4.00	@	4.25
No. 2 White Cotton	3.25	@	3.50
No. 3 White Cotton	2.50	@	3.00
No. 4 White Cotton	1.45	@	1.60
Extra Light Prints	1.90	@	2.10
Ord. Light Prints	1.60	@	1.75
Med. Light Prints	1.40	@	1.55
Dutch Blue Cottons	1.50	@	1.60
French Blue Linens	2.25	@	2.40
German Blue Linens	2.00	@	2.10
German Blue Cottons	1.35	@	1.40
Checks and Blues	1.25	@	1.30
Lindsay Garments	.85	@	.90
Dark Cottons	.65	@	.70
Old Shopperies	.60	@	.65
New Shopperies	.55	@	.60
French Blues	1.40	@	1.50

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—			
Foreign	1.35	@	1.40
Domestic	1.50	@	1.55
Wool Tares, light	1.05	@	1.10
Wool Tares, heavy	1.05	@	1.10
Bright Bagging	1.00	@	1.05
Small Mixed Rope	.85	@	.90
Manila Rope—			
Foreign	1.55	@	1.60
Domestic	1.75	@	1.90
New Burlap Cut	1.70	@	1.80
Hessian Jute Threads—			
Foreign	2.60	@	2.75
Domestic	2.80	@	3.00

Old Waste Papers

(F. o. b. New York)

Shavings—			
Hard, white, No. 1	2.50	@	2.60
Hard, white, No. 2	2.10	@	2.20
Soft, white, No. 1	2.00	@	2.10
White envelope cuttings	2.25	@	2.40
Flat Stock—			
Stitchless	.70	@	.80
Overissue Mag.	.70	@	.80
Solid Flat Book	.60	@	.70
Crumpled No. 1	.48	@	.53
Solid Book Ledger	1.75	@	1.85
Ledger Stock	.65	@	.75
New B. B. Chips	.20	@	.30
Manilas—			
New Env. Cut	1.75	@	1.85
New Cuttings	1.40	@	1.50
Extra No. 1 old	1.10	@	1.25
Print	.45	@	.50
Bogus Wrapper	.45	@	.50
Container	.30	@	.35
Old Kraft Machine—			
Compressed bales	1.10	@	1.20
News—			
No. 1 White News	1.60	@	1.65
Strictly Overissue	.35	@	.45
Strictly Folded	.33	@	.38
No. 1 Mixed Paper	.25	@	.30
Common Paper			Nominal

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CONSULTING ENGINEERS
For Paper Mills
GRAND CENTRAL TERMINAL BLDG., NEW YORK

De Laval
Steam Turbine Co., Trenton, N.J.
Steam Turbines, for all speed and steam conditions; capacities up to 15,000 hp. Catalog D45. Helical Gears. Catalog B45. Centrifugal Pumps, for all capacities. Catalog B45. Centrifugal Blowers and Compressors. Catalog F-45. Worm Reduction Gears. Catalog R45. Flexible Couplings. Catalog K45. Water Wheels. Catalog T45.

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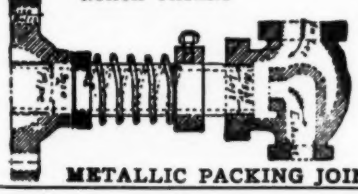
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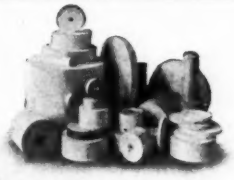
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Philadelphia, Pa.

Wisconsin Wire Works
FOURDRINIER WIRES
ROLLED WIRES, CYLINDER AND WASHER WIRES
APPLETON, WIS.

Twines

(F. o. b. Mill)

Cotton—			
B. C., 18 basis	.30	@	.32
No. 1	.20	@	.22
No. 2	.19	@	.20
No. 3	.17	@	.18
A. Italian, 18 basis	.36	@	.37
Finished Jute—			
Dark, 18 basis	.18	@	.20
Light, 18 basis	.20	@	.22
Jute Wrapping, 3-6 Ply—			
No. 1	.13	@	—
No. 2	.11	@	—
Tube Rope—			
4-ply and larger	.09	@	—
Fine Tube Rope—			
4-ply	.11	@	—
3-ply	.12	@	—
2-ply	.13	@	—
Paper Makers Twine Balls	.07	@	—
Box Twine, 2-3 ply	.07	@	.08
Jute Rope	.09	@	.10
Amer. Hemp, 6	.27	@	.29
Java Sisal—			
No. 1 Basis	.10	@	—
No. 2 Basis	.09	@	—
New Zealand Sisal	.10	@	—
Sisal Lath Yarn—			
No. 1	.12	@	.14
No. 2	.10	@	.12
Manila Twine	.21	@	.22

CHICAGO

Paper

(F. o. b. Mill)

Rag Bond	.30	@	.53¼
Water Marked Sulphite Bond	.09	@	.12
Sulphite Bond	.06¼	@	.11
Superfine Writing	.18	@	.24
No. 1 Fine Writing	.14	@	.18
No. 2 Fine Writing	.12	@	.14
No. 3 Fine Writing	.08½	@	.12
No. 1 M. F. Book	.06½	@	.07½
No. 2 M. F. Book	.05¼	@	.06¼
No. 1 S.&S.C. Book	.06¾	@	.07¾
No. 2 S.&S.C. Book	.05¾	@	.06½
Coated Book	.07½	@	.12
Coated Label	.07½	@	.10
No. 1 Manila	.04¾	@	.05¾
No. 1 Fibre	.04¾	@	.05¼
No. 2 Manila	.04¼	@	.04¾
Butcher's Manila	.04	@	.04½
No. 1 Kraft	4.50	@	5.00
Southern Kraft	3.00	@	3.25
No. 2 Kraft	3.00	@	3.25
Wood Tag Boards	.04¼	@	.06¼
Sulphite Screenings	.03	@	.03¼
Manila Tissue	.07	@	.07¼
White Tissue	.07¼	@	.07½

(Delivered Central Territory)

News, per ton—			
Rolls, contract	57.00	@	—
Sheets	62.00	@	—
Boards, per ton—			
Plain Chip	30.00	@	35.00
Solid News	32.50	@	37.50
Manila Lined Chip	40.00	@	45.00
Container Lined—			
85 Test	50.00	@	55.00
100 Test	55.00	@	60.00

Old Papers

(F. o. b. Chicago)

Shavings—			
No. 1 Hard White	1.95	@	2.05
No. 1 Soft White	1.80	@	1.90
Ledger & Writings	.60	@	.70
Solid Books	.60	@	.70
Blanks	1.40	@	1.55
Krafts	1.15	@	1.25
New Kraft Cuts	1.30	@	1.45
Manila Env. Cuts	1.40	@	1.50
ex. No. 1 Manila	1.25	@	1.30
Print Manila	.40	@	.45
Overissue News	.40	@	.50
Old Newspapers—			
No. 1	.35	@	.45
No. 2	.30	@	.35
Mixed Papers—			
No. 1	.25	@	.30
No. 2	.20	@	.25
Roofing Stocks—			
No. 1	30.00	@	—
No. 2	28.00	@	—

PHILADELPHIA

Paper

(F. o. b. Mill)

Bonds	.05	@	.40
Ledgers	.07	@	.40
Writings—			
Superfine	.12	@	.18
Extra fine	.16	@	.22
Fine	.15	@	.26
Fine, No. 2	.12	@	.25
Fine, No. 3	.07	@	.20
Book, M. F.	.04¾	@	.07
Book, S. S. & C.	.05	@	.07½
Book, Coated	.07	@	.16
Coated Lithograph	.06	@	.11
Label	.07	@	.11
No. 1 Jute Manila	.07	@	.09
Manila Sul., No. 1	.03¼	@	.05½
Manila No. 2	.03	@	.04
No. 1 Kraft	.05¼	@	.06
No. 2 Kraft	.03¾	@	.04¼
Southern Kraft No. 1	—	@	.04
Southern Kraft No. 2	—	@	.03¾
Common Bogus	.03	@	.04

(Delivered Philadelphia)

News Print Rolls	58.00	@	62.00
Straw Board	50.00	@	—
News Board	30.00	@	32.00
Chip Board	25.00	@	27.50
Wood Pulp Board	85.00	@	95.00
Binder Boards—			
No. 1, per ton	73.00	@	75.00
No. 2, per ton	63.00	@	65.00
Carload lots	62.00	@	67.00
Tarred Felts—			
Regular	52.25	@	54.25
Slaters (per roll)	.84	@	.94
Best Tarred, 1-ply (per roll)	1.95	@	2.10
Best Tarred, 2-ply (per roll)	1.50	@	1.60
Best Tarred, 3-ply	2.00	@	2.25

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1.	.06	@	.06½
New White, No. 2.	.05	@	.05½
Light Silesias	.05	@	.05½
Silesias, No. 1	.06	@	.08
Black Silesias, soft.	.05	@	—
New Unbleached	.06	@	.06½
Washable, No. 1	.02½	@	.03
Blue Overall	.05	@	.05½
Cottons—According to grades—			
Washable, No. 2	.02	@	.02½
New Blue	.02	@	.02½
Fancy	.03	@	.03¼
New Black Soft	.03	@	.03½
New Light Seconds	.01¾	@	.02
New Dark Seconds	1.85	@	2.00
Khaki Cuttings—			
No. 1 O. D.	.04½	@	.05
No. 2 Mixed	.03½	@	.04
Corduroy	.02½	@	.03
New Canvas	.06½	@	.07
New Black Mixed.	.03	@	.03½

Domestic Rags (Old)

White No. 1—			
Repacked	3.50	@	4.00
Miscellaneous	2.25	@	2.75
M. G.	4.50	@	—
Thirds and Blues—			
Miscellaneous	1.25	@	1.50
Repacked	1.75	@	2.00
Black Stockings (Export)	3.80	@	4.00
Roofing Stock—			
Foreign No. 1	1.15	@	1.25
Repacked	.80	@	.90

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	1.50	@	1.60
Domestic	1.75	@	—
Manila Rope	2.25	@	2.50
Sisal Rope	1.25	@	1.50
Mixed Rope	1.10	@	1.25
Scrap Burlaps—			
No. 1	1.50	@	1.60
No. 2	1.10	@	1.20
Wool Tares, heavy	3.00	@	—
Mixed Strings	1.15	@	1.25
No. 1 New Light Burlap	2.50	@	2.75
New Burlap Cuttings	2.00	@	2.25

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White.	2.30	@	2.50
No. 2 Hard White.	2.00	@	2.25
No. 1 Soft White.	1.75	@	2.00
No. 2 Soft White.	1.40	@	1.50
No. 1 Mixed	.75	@	.80
No. 2 Mixed	.50	@	.55
Solid Ledger Stock.	1.35	@	1.40
Writing Paper	.80	@	1.00
No. 1 Books, heavy	.70	@	.75
No. 2 Books, light	Normal		
No. 1 New Manila	1.60	@	1.75
No. 1 Old Manila	1.25	@	1.30
Print Manila	.50	@	.55
Container Manila	.40	@	.45
Old Kraft	1.10	@	1.20
Common Paper	.30	@	.40
No. 1 Mixed Paper	.35	@	.45
Straw Board, Chip	.35	@	.45
Binders Board, Chip	.35	@	.45
Corrugated Board	.45	@	.50
Overissue News	.50	@	.55
Old Newspaper	.30	@	.35

BOSTON

Paper

(F. o. b. Mill)

Ledgers—			
Sulphite	—	@	.06½
Rag Content	.15	@	.30
All Rag	.38	@	.52½
Bonds—			
Sulphite	—	@	.06½
Rag content	.15	@	.30
All rag	.36½	@	.65
Writings	.06½	@	.20
Superfines	.11	@	.31
Book, Super	.06	@	.09
Book, M. F.	.05½	@	.08½
Book, Coated	.08½	@	.18
Coated Litho	.09	@	.12
Label	.09½	@	.15
Jute Manila No. 1	.11	@	.13
Manila, Sul. No. 1	.04¾	@	.06½
Manila, Sul. No. 2	.03¾	@	.04½
No. 1 Kraft	.04½	@	.05½
No. 2 Kraft	—	@	.03

(F. o. b. Boston)

Southern Kraft	—	@	.03

(F. o. b. destination in carload lots, f. o. b. mill in less than carload lots.)

Common Bogus	.02	@	.02¾

(Delivered New England points)

News Print, rolls	—	@	56.50
Straw Board, rolls.009	—	@	52.50
Straw Board in Sheets, basis 35s to 70s	—	@	50.00
Filled News Board	27.50	@	30.00
Chip Board	27.50	@	—
Chip Board (Creasing)	27.50	@	30.00
Single Manila Lined Chip	40.00	@	45.00
Single White, Patent Coated News Board—Binder	52.50	@	60.00
Wood Pulp Board	70.00	@	75.00
Binder Boards	67.50	@	75.00

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White	2.75	@	3.50
No. 2 Hard White	2.25	@	2.50
No. 1 Soft White	1.90	@	2.10
No. 2 Mixed	.60	@	.65
No. 1 Mixed	.90	@	1.00
Solid Ledger Books	1.75	@	2.00
Overissue Ledger Stock	1.35	@	1.60
Mixed Ledgers	1.15	@	1.30
No. 1 Books, heavy	.65	@	.75
No. 1 Books, light	—	@	.45
Crumpled Stitchless Book Stock	1.00	@	1.25
Manila Env. Cuttings	1.85	@	2.00
No. 1 Old Manila	—	@	1.00
White Blank News	1.57½	@	1.65
Kraft No. 1	100	@	1.10
Manila	.90	@	1.00
No. 1 Mixed Paper	.25	@	.35
Print Manila	.40	@	.45
Overissue News	.40	@	.45
Old Newspapers	.30	@	.37½
Box Board, Chip	.20	@	.25
Corrugated Boxes	.37½	@	.47½

Bagging

(F. o. b. Boston)

Gunny No. 1—			
Foreign	—	@	1.25
Domestic	1.40	@	1.50
Manila Rope—			
Foreign	1.50	@	1.75
Domestic	1.75	@	2.00
Transmission Rope	1.25	@	1.40
Mixed String	.35	@	.40
Jute Rope	1.00	@	1.15
Jute Carpet Threads	.75	@	.90
Bleachery Burlap	2.50	@	2.75
No. 1 Scrap Burlap	1.10	@	1.25
Scrap Sisal	1.35	@	1.45
Scrap Sisal for shredding	1.50	@	1.60
Wool Tares, heavy	1.25	@	1.30
New Burlap Cutting	1.50	@	1.25
Australian Pouches	2.00	@	2.25
Heavy Baling Bagging	1.50	@	1.60
Paper Mill Bagging	.90	@	1.05
Bagging No. 2	.50	@	—
No. 1 Burlap	—	@	3.50

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New White No. 1.	.06½	@	.07
New White No. 2.	—	@	.06
Silesias No. 1	.06	@	.06¼
New Black Silesias	.02½	@	.02¾
New Unbleached	—	@	.08
Fancy	.04	@	.04¼
Washable	.04	@	.04½
Cottons—According to grades—			
Blue Overalls	.05	@	.06
New Black, soft	.04	@	.04¼
Khaki Cuttings	.04	@	.04½
O. D. Khaki	.04½	@	.05
Corduroy	.03	@	.03¼
New Canvas	.08	@	.08¼

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04¼	@	—
White No. 1—			
Repacked	4.75	@	5.25
Miscellaneous	—	@	4.90
White No. 2—			
Repacked	.04½	@	.05
Miscellaneous	.03½	@	.04
Twos and Blues	2.50	@	2.75
Thirds and Blues—			
Repacked	1.60	@	1.80
Miscellaneous	1.00	@	1.20
Black Stockings	3.25	@	3.50
Roofing Stock—			
No. 1	—	@	.63
No. 2	—	@	.58
No. 3	—	@	.53

Foreign Rags

(F. o. b. Boston)

Dark Cottons	—	@	.70
New No. 1 White Shirt Cuttings	6.50	@	6.75
Dutch Blues	—	@	1.80
New Checks & Blues	4.00	@	4.50
Old Fustians	1.55	@	1.65
Old Linsey Garments	.80	@	.90

TORONTO

Paper

(F. o. b. Mill)

Bond—			
No. 1 Sulphite	.10¼	@	—
No. 2 Sulphite	.08½	@	—
No. 1 Colored	.11¼	@	—
No. 2 Colored	.09	@	.10½
Ledgers (sulphite)	—	@	—
Ledgers, No. 1	.36	@	—
Ledgers, No. 2	.27	@	—
Writing	.09½	@	.10
Book—			
No. 1 M. F. (carloads)	6.65	@	—
No. 3 M. F. (carloads)	6.20	@	—
No. 1 S. C. (carloads)	7.15	@	—
No. 3 S. C. (carloads)	6.65	@	—
No. 4 S. C. (carloads)	5.70	@	—
No. 1 Coated and Litho	12.50	@	—
No. 2 Coated and Litho	11.50	@	—
No. 3 Coated and Litho	10.00	@	11.50
Coated tinted	14.00	@	—
Wrapping—			
Rag Brown	4.60	@	—
White Wrap	5.10	@	—
"B" Manila	5.00	@	—
No. 1 Manila	5.60	@	—
Fiber	5.60	@	—
Kraft, M. F.	5.98	@	—
Kraft No. 2	5.60	@	—

(Delivered Toronto)

News, per ton—			
Rolls (contract)	56.50	@	57.00
Sheets	61.50	@	—

Pulp

(F. o. b. Mill)

Ground Wood	30.00	@	32.00
Sulphite easy bleaching	50.00	@	—
Sulphite, news grade	44.00	@	—
Sulphite, bleached	62.50	@	75.00
Sulphate	60.00	@	—

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut	2.60	@	—
Soft White	2.40	@	—
White Blk. News	1.40	@	—
Book and Ledger—			
Flat Magazine and Book Stock (old)	.90	@	—
Light and Crumpled Book Stock	1.05	@	—
Ledgers and Writings	—	@	—
Manilas—			
New Manila Cut	1.40	@	—
Printed Manilas	.50	@	—
Kraft	1.65	@	—
News and Scrap—			
Strictly Overissue	.50	@	—
Strictly Folded	.45	@	—
No. 1 Mixed Paper	.35	@	—

Domestic Rags

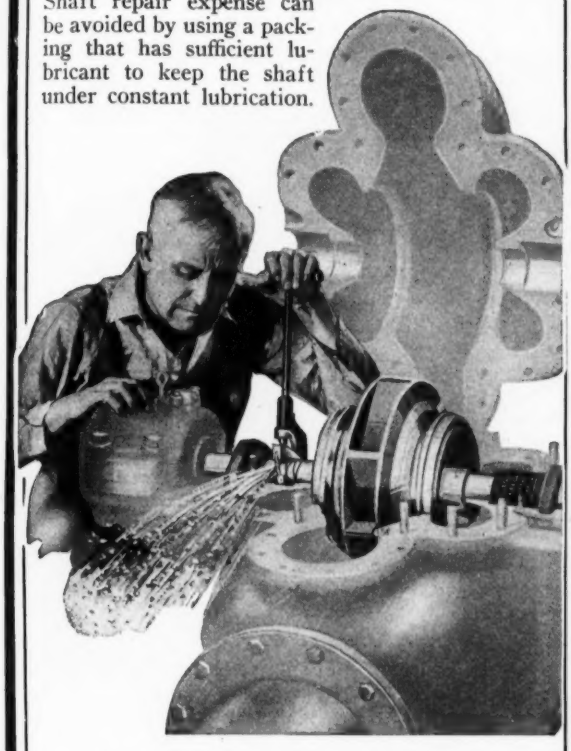
(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.09½	@	.10
Fancy Shirt Cuttings	.06	@	.06¼

Some Packings Wear the Shaft Like a Pipe Cutter

Friction Caused by Unlubricated Packings Will Destroy the Shaft

Shaft repair expense can be avoided by using a packing that has sufficient lubricant to keep the shaft under constant lubrication.



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It carries in each separate strand, a lubricant that resists the washing-out tendency of solutions of Caustic Soda and similar Chemicals. "CUTNO" holds its lubricant for lubricating purposes.

Flax Packing Ruined This Shaft

Let us send you free working sample of "Cutno" for practical test. State size of packing used.

FOR STEAM USE PALMETTO PACKING

GREENE, TWEED & CO.

Sole Manufacturers

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PAPER TRADE JOURNAL

ESTABLISHED 1872

THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY AND THE PIONEER PUBLICATION IN ITS FIELD

SIXTIETH YEAR

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Capacity 100,000 tons per year.

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The white pigment of highest known opacity value. Technically it is the whitest and brightest of all white pigments.

It has the highest hiding power and tinting strength and the greatest resistance to chemical change of any known white opaque pigment.

Rayox may also be successfully used to increase the finish and opacity of your coating solution.